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CHEMICAL WASTE LAND DISPOSAL FACILITY DEMONSTRATION GRANT APPLICATION

Minnesota Pollution Control Agency

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The U. S. Environmental Protection Agency has awarded the Minnesota Pollution Control Agency a grant to demonstrate land disposal techniques for potentially hazardous chemical wastes (solids, sludges, and slurries). This document presents the demonstration approach as it is proposed in the grantee's application. The application identifies and discusses: work tasks, potential facility designs, personnel needs, budget needs, contractor/consultant arrangements, implementation procedures, evaluating and reporting procedures, and the existing regulatory framwork.

This initial document will be followed by a second interim report at the end of the second project year (fall 1977) and a final report at the end of the demonstration period (late 1980).

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CHEMICAL WASTE LAND DISPOSAL FACILITY

DEMONSTRATION GRANT APPLICATION

This interim report (SW-87d.i) on work to be performed under solid waste management demonstration grant No. S803744 was prepared for the Minnesota Pollution Control Agency by the BARR ENGINEERING COMPANY

U.S. ENVIRONMENTAL PROTECTION AGENCY
1976

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ABSTRACT

In June of 1975, the Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, awarded a five-year grant to the Minnesota Pollution Control Agency, Division of Solid Waste, to demonstrate land disposal techniques for potentially hazardous chemical wastes. This document, prepared by Barr Engineering Co., represents the demonstration approach as it was proposed in the grantee's application. The application identifies and discusses: work tasks, potential facility designs, personnel needs, budget needs, contractor/consultant arrangements, implementation procedures, evaluating and reporting procedures, and the existing regulatory framework.

This initial document will be followed by a second interim report at the end of the second project year (fall 1977) which will discuss final site selection, final facility design, and environmental impact analysis. A final report at the end of the demonstration period (late 1980) will discuss final project results.

This report has been reviewed by the U.S. Environmental Protection Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the U.S. Environmental Protection Agency, nor does mention of commercial products constitute endorsement by the U.S. Government.

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TABLE OF CONTENTS

Page

DESCRIPTION OF APPLICANT 1

BUDGET SUMMARY 3

MANDATORY REQUIREMENTS 6

5.1 Assurance of Continued Operation 6

5.2 Appropriate State Regulations 6

5.3 Elimination of Unacceptable Disposal Practices 7

5.4 Regulatons in Compliance with OSWMP Guidelines 7

5.5 Grant Operation and Management Requirements 7

EVALUATIVE CRITERIA 8

6.1 Nationwide Applicability 9

6.2 Statewide Needs 17

6.3 Site Selection 28

6.4 Disposal Area Preparation Techniques 36

6.5 Waste Preparation Techniques 46

6.6 Environmental Protection Strategies 53

6.7 Institutional Arrangements 62

6.8 Facility Management Strategy 80

6.9 Cost Accounting Strategy 102

6.10 Social Implications 114

6.11 Implementation Schedule 125

6.12 Project Budget and Funding Strategy 135

6.13 Potential Difficulties 143

SUMMARY OF MINNESOTA LAWS PERTAINING TO HAZARDOUS WASTE MANAGEMENT 146

CASE STUDIES OF IMPROPER CHEMICAL WASTE MANAGEMENT 175

DESCRIPTION OF APPLICANT

Reproduced from best available copy.

The Minnesota Pollution Control Agency (applicant) is the principal state environmental protection advocate within Minnesota. The Agency is an independent unit of state government consisting of nine citizen members appointed by the Governor and an Executive Director also appointed by the Governor. The Executive Director oversees an Agency Staff of approximately 235 employees with expertise in air, water and land resource protection. Under Minnesota Law, the Pollution Control Agency is empowered to:

a) administer and enforce all state laws relating to pollution,

b) investigate instances of pollution of the air, water and land resources of the state,

c) establish pollution control standards and regulations, and

d) regulate the disposal of all wastes which may pollute the environment.

Hazardous waste regulation is administered through the Air, Water and Solid Waste Divisions of the Agency. Under Minnesota Statutes Chapter 116.1, the Agency is charged with "achieving a reasonable degree of purity of water, air and land resources of the state, consistent with the maximum enjoyment and use therefore in furtherance of the welfare of the people of the state". To carry out this responsibility, the applicant is presently regulating hazardous waste in the following manner:

- Hazardous wastes discharged directly to public waters are regulated through effluent standards and stream standards established for all public waters of the state. Waste dischargers must obtain an NPDES permit from the Agency which sets forth the allowable waste discharge requirements. In a similar fashion, hazardous wastes discharged directly to the atmosphere are controlled by emission and ambient air quality standards. Dischargers must obtain a permit from the Agency to discharge waste to the atmosphere. The permit sets forth the allowable waste concentrations in the emission.

- Hazardous Waste Regulations are in the process of being drafted by the applicant When adopted, these Regulations will establish performance and procedural standards for hazardous waste identification, labeling, classification, storage, collection, transportation, treatment and disposal. In addition, the regulations will provide a detailed definition of "hazardous waste".

- The Solid Waste Rules and Regulations of the Pollution Control Agency regulate hazardous wastes as they relate to disposal at sanitary landfills. The Rules and Regulations also establish standards for hazardous waste storage, collection, transportation and incineration. Standards in the Solid Waste Rules and Regulations which relate to hazardous waste will be included in the Hazardous Waste Regulations. The present Solid Waste Rules and Regulations prohibit the land disposal of hazardous waste at sanitary landfills. Sanitary landfills, however, must provide hazardous waste storage areas to temporarily store hazardous waste transported to the sanitary landfills. On-land hazardous waste disposal facilities permitted under former solid waste regulations have been discontinued.

- Hazardous waste incinerators must obtain a solid waste facility permit from the Pollution Control Agency. Hazardous waste incinerators must meet the Pollution Control Agency air quality regulations and obtain air emissions permits. If incinerators utilize equipment creating a liquid effluent, a waste disposal system permit must be obtained.

- Minnesota's water pollution control regulations regulate the storage of oil and other liquid substances capable of polluting the waters of the state. The regulations require that all areas used to store oil and other liquid substances have an impervious bottom and be enclosed with continuous dikes. A permit must be obtained from the Pollution Control Agency to operate a site storing oil or other liquid substances capable of polluting the waters of the state.

As discussed in Section 6.2 of this Supplemental Information, a chemical waste land disposal facility is needed in Minnesota to insure the effective operation of its hazardous waste management program. The demonstration grant is not only consistent with Minnesota's hazardous waste management efforts, but is a critical component of the state hazardous waste management program.

BUDGET SUMMARY

This section of the demonstration grant summarizes the detailed demonstration budgets included in Section 6.12. Additional budget information is available in Section 6.12.

3.1 FIRST YEAR OF DEMONSTRATION PERIOD

	First Quarter		Second Quarter		Third Quarter		Fourth Quarter	
	Total	EPA	Total	EPA	Total	EPA	Total	EPA
Personnel	$ 8,150	$ 6,112	$12,300	$ 9,225	$ 15,350	$11,512	$ 15,300	$ 11,475
Fringe Benefits	1,222	917	1,845	1,384	2,303	1,728	2,295	1,721
Travel	500	375	500	375	300	225	390	292
Equipment	3,100	2,325	--	--	--	--	--	--
Supplies	200	150	200	150	200	150	290	218
Contractual Personnel Services	--	--	5,000	3,750	50,000	37,500	70,000	52,500
Construction	--	--	--	--	50,000	37,500	300,000	225,000
Other	6,800	5,100	4,100	3,075	3,400	2,550	4,900	3,675
TOTALS	$19,972	$14,979	$23,945	$17,959	$121,553	$91,165	$393,175	$294,881

3.2 TOTAL DEMONSTRATION PERIOD (Projected Budgets)

The projected budgets for the total five-year demonstration period are summarized on page 3-2. Additional demonstration period budget data is included in Section 6.12.

3.3 FUNDING SOURCES

The funding sources and projected funding amounts are summarized on page 3-3. Additional funding data is included in Section 6.12.

PROJECTED BUDGETS TOTAL DEMONSTRATION PERIOD

	First Year		Second Year		Third Year		Fourth Year		Fifth Year	
	Total	EPA	Total	EPA	Total	EPA	Total	EPA	Total	EPA
Personnel	$ 51,100	$ 38,325	$ 62,945	$ 47,209	$ 72,632	$ 53,327	$ 61,560	$ 27,463	$ 63,210	$ 17,933
Fringe Benefits	7,665	5,749	9,442	7,082	10,895	7,999	9,234	4,119	9,482	2,690
Travel	1,690	1,268	1,860	1,394	2,570	1,887	2,020	901	2,020	573
Equipment	3,100	2,325	760,000	570,000	320,000	234,944	20,000	8,922	50,000	14,186
Supplies	890	667	1,350	1,013	1,400	1,028	1,400	626	1,400	398
Contractual Personnel Services	125,000	93,750	250,000	187,500	245,000	179,879	210,000	93,686	230,000	65,254
Construction	350,000	262,500	590,000	442,500	1,696,000	1,245,204	50,000	22,306	30,000	8,511
Other	19,200	14,400	30,000	22,500	25,000	18,355	16,000	7,138	16,000	4,539
TOTALS	$558,645	$418,984	$1,705,597	$1,279,198	$2,373,497	$1,742,623	$370,214	$165,161	$402,112	$114,084

FUNDING SOURCES

SUMMARY OF YEARS

	FEDERAL	NONFEDERAL*	USER FEES	TOTAL
First Year	$ 418,984	$ 139,661	$ ---	$ 558,645
Second Year	1,279,198	426,399	---	1,705,597
Third Year	1,742,623	580,874	50,000	2,373,497
Fourth Year	165,161	55,053	150,000	370,214
Fifth Year	114,084	38,028	250,000	402,112
TOTALS	$3,720,050	$1,240,015	$450,000	$5,410,065

* County or Metropolitan Waste Control Commission revenue bonds.

MANDATORY REQUIREMENTS

5.1 ASSURANCE OF CONTINUED OPERATION

The applicant assures that acceptable operations will be continued beyond the grant period through a system of user's fees to recover the full cost of the facility. As set forth in the legal memorandum in Appendix I, the applicant has the authority to contract with an intermediate governmental agency to operate the facility. Intermediate governmental agencies identified in Section 6.7.2 have the authority to collect user fees to support the facility from the beginning of operation. The user fees will not be reduced by the amount of the Federal grant during the grant period. As set forth in the cost accounting strategies outlined in Section 6.9 of this grant application, the facility user fees will be sufficient to recover capital expenditures over the life of the operation, all operating and maintenance costs as well as the cost of closing and perpetually monitoring the facility. The applicant intends to structure the user fees to represent the true cost of the environmentally safe land disposal of chemical wastes.

5.2 APPROPRIATE STATE REGULATIONS

The Minnesota Solid Waste Rules and Regulations are included in Appendix B of this application. These rules and regulations regulate the disposal of solid waste as well as hazardous waste in Minnesota. Statewide hazardous waste regulations are presently being drafted. The hazardous waste regulations will establish performance and procedural standards for hazardous waste identification, labeling, classification, storage, collection, transportation, treatment and disposal. The portions of the Solid Waste Rules and Regulations pertaining to hazardous waste management will be included in the hazardous waste regulations when they are adopted. The applicant will continue to enforce the Solid Waste Rules and Regulations within Minnesota and will enforce the hazardous waste regulations when they are adopted.

5.3 ELIMINATION OF UNACCEPTABLE DISPOSAL PRACTICES

Such unacceptable waste disposal practices as open burning, unregulated land disposal and uncontrolled dumping have been eliminated by legislation and by subsequent regulations within Minnesota. The legislation authorizing the elimination of unacceptable disposal practices will be furnished if necessary. The regulations mandating the elimination of unacceptable waste disposal practices are included in Appendix B.

5.4 REGULATIONS IN COMPLIANCE WITH OSWMP GUIDELINES

The Solid Waste Rules and Regulations are in conformance with OSWMP recommended guidelines and practices. The applicant is working closely with the Environmental Protection Agency to insure that the statewide hazardous waste regulations are also in conformance with OSWMP guidelines. The applicant has received other demonstration grants from the Environmental Protection Agency Office of Solid Waste Management Program. The Solid Waste Rules and Regulations are uniform within the applicant's jurisdiction.

5.5 GRANT OPERATION AND MANAGEMENT REQUIREMENTS

The education and experience of the grant management personnel are summarized in Appendix F. As shown in Appendix F, personnel on the grant management team have administered a number of solid waste grants. The applicant agrees to submit status and evaluative reports quarterly on technical, economic and social/institutional aspects of the demonstration project. The applicant also agrees to carry out an annual project audit. In addition, interim reports will be completed on certain key project elements as key demonstration milestones are reached.

As set forth in Section 6.7.2, the site owner and operator have not been selected due to time constraints and due to the possibility of legislative changes in the metropolitan area solid and hazardous waste operating responsibilities.

EVALUATIVE CRITERIA

The Evaluative Criteria Section of the demonstration grant application outlines the methods of approach the applicant intends to follow in selecting the various technical, economic and social/institutional techniques that will be needed to establish and operate the chemical waste land disposal demonstration facility. The sections have been arranged in the approximate order outlined in the Evaluative Criteria Section of the Requirements and Criteria for the Chemical Waste Land Disposal Grant as distributed by the Environmental Protection Agency.

Section 6.1 discusses the reasons the applicant believes that results from a chemical waste land disposal demonstration project located in Minnesota will be applicable anywhere in the United States. Section 6.2 discusses the statewide need for a chemical waste land disposal facility and illustrates why the location of the demonstration project in Minnesota will not only serve a nationwide need, but will help solve a critical statewide need as well. The various site selection criteria, alternative sites, for the demonstration project are discussed in Section 6.3. Section 6.4 discusses the various disposal site preparation techniques such as bottom liners, rainfall percolation sealants, leachate collection and recirculation/treatment systems and waste placement techniques that will be evaluated for incorporation into the project. The ability of the various techniques to contain the wastes will, of course, be a critical part of the disposal site preparation demonstration. In a similar fashion, Section 6.5 discusses the various waste preparation techniques that will be evaluated for use in the demonstration project. The primary purpose of the waste preparation techniques will be to supply wastes with a wide range of characteristics for demonstration purposes.

The "second level" of environmental protection facilities to be provided at the eventual disposal site are discussed in Section 6.6. The "first level" of environmental protection facilities are the liners, sealants and leachate collection systems discussed in Section 6.4. Due to the nature of the demonstration project, however, the applicant recognizes that certain demonstrations may not be completely successful and for this reason a second waste barrier/leachate collection system as well as a series of barrier wells, surface runoff storage areas, and air contaminant control facilities will be utilized to provide a second level of environmental protection. The first and second levels of environmental protection plus the site selection criteria have all been carefully designed to insure an environmentally fail-safe operation.

Sections 6.7, 6.8 and 6.9 discuss the institutional arrangements, facility operation and management strategies and cost accounting strategies that will be evaluated for incorporation into the demonstration project. Section 6.10 discusses the various social aspects of the project and the strategies that the applicant will use to gain citizen acceptance and encourage educational use of the project. Section 6.11 and 6.12 set forth the implementation schedule, project budgets and funding sources. Section 6.13 discusses the potential difficulties the applicant foresees in establishing the demonstration project in Minnesota and outlines strategies to overcome these potential difficulties.

The applicant believes that the detailed technical, economic and social/institutional strategies presented in this section of the grant application illustrate the competitive advantage that Minnesota enjoys over other areas of the country in meeting the evaluative criteria set forth in the Requirements and Criteria for the Demonstration Grant.

6.1 NATIONWIDE APPLICABILITY OF RESULTS

A number of features unique to Minnesota insure that the chemical waste land disposal demonstration project will generate significant conclusions having general applicability to chemical waste management problems in other areas of the country. The features which insure the nationwide applicability of data generated in Minnesota include:

- The Existence of Comprehensive Hazardous Waste Regulatory Legislation
- A High Degree of Citizen Participation in Decision Making
- Diverse Industry Producing a Wide Variety of Chemical Wastes
- A High Level of Industrial Awareness
- Good Road and Rail Access
- Extreme Climatological Conditions

6.1.1 The Existence of Comprehensive Hazardous Waste Regulatory Legislation

The existing hazardous waste legislative/regulatory atmosphere in Minnesota is presently well-suited to insure the immediate and long-term use of the chemical waste land disposal facility. Minnesota was one of the first states to realize the need for hazardous waste regulation. Early solid waste regulations adapted in 1970 attempted to define "toxic and hazardous waste" and set aside special disposal areas in sanitary landfills. This philosophy has since been abandoned, however, it does point out that the applicant has been working with hazardous waste disposal for over five years. A report entitled, "Hazardous Waste Generation--Twin Cities Metropolitan Area" has recently been completed for the applicant and for the counties in the Minneapolis/ St. Paul metropolitan area of Minnesota.(1) The study identified the quantities of various categories of hazardous waste generated in the metropolitan area, documented that a large portion of the generated waste was being disposed of in an unknown and, therefore, unregulated manner and recommended a hazardous waste regulatory system to combat the problem. The framework for the recommended hazardous waste regulatory system included a hazardous waste generator licensing system and a hazardous waste transportation licensing system. The hazardous waste treatment/disposal facility permit system presently being administered by the applicant and by the counties was found to be generally adequate. The recommendations of the study are presently being implemented through enabling legislation adopted by the 1974 Minnesota Legislature.

A copy of the State hazardous waste legislation is included in Appendix A of this grant application. As a result of that legislation, the applicant:

a) must adopt standards relating to identification, labeling, classification, storage, collection, transportation and disposal of hazardous waste.

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(1) Footnotes refer to references listed in the Reference Section of this application.

b) must issue or deny permits for labeling, classification, storage and collection of hazardous waste (in the absence of a county generator licensing system).

c) may issue or deny permits for the treatment and/or disposal of hazardous waste.

In addition to the applicant's responsibilities, the legislation enpowered counties throughout Minnesota to:

a) by ordinance establish rules, regulations and standards relating to the identification, labeling, handling, collection, transportation, storage and disposal of hazardous waste (this responsibility is mandatory for counties in the Minneapolis/St. Paul metropolitan area).

b) issue licenses to hazardous waste generators and charge a license fee to pay for costs incurred by the county in the generator licensing program (this responsibility is also mandatory for counties in the Minneapolis/St. Paul metropolitan area).

Existing solid waste, air quality and water quality legislation is now sufficient to enable the applicant to regulate hazardous waste management statewide and to implement the demonstration chemical waste land disposal facility. At the time of this grant application, the applicant has drafted hazardous waste regulations to implement the new legislation. The counties in the Minneapolis/St. Paul metropolitan area have drafted a model hazardous waste ordinance to implement the new hazardous waste legislation at the county level. A copy of the draft hazardous waste model ordinance is included in Appendix C of this grant application.

In summary, the applicant believes that the hazardous waste legislation/regulatory atmosphere in Minnesota is ideally suited to the implementation of the demonstration project. The generator licensing system now being implemented in the metropolitan area will insure that all hazardous waste sources are identified and required to transport their hazardous wastes to a regulated disposal facility. Thus, a supply of all types of hazardous waste generated in the area is guaranteed to the demonstration facility. The generator licensing system also gives the applicant and the counties a means to predict and even manage the flow of hazardous wastes in the metropolitan area.

6.1.2 A High Degree of Citizen Participation in Decision Making

Minnesota citizens are well-known for a high degree of concern for a quality environment. Various citizen groups have lobbied for and helped pass a large volume of environmental protection legislation including an Environmental Rights Act giving citizens the right to initiate lawsuits to enforce environmental regulations, environmental impact legislation which mandates the preparation of environmental assessments and environmental impact statements for projects of more than local environmental significance and a Critical Areas Act which sets forth procedures to protect identified areas in the state possessing values of greater than local significance. As a result of these efforts and as a result of a number of judicial actions such as the Reserve Mining Co. discharge to Lake Superior and potential mining and timber cutting in the Boundary Waters Canoe Area, the various citizen groups are well-organized with identifiable spokesmen. The high level of citizen interest in environmental matters and the well-organized nature of the various citizen groups will enable the various strategies for gaining citizen acceptance of the demonstration facility to generate significant conclusions applicable on a nationwide basis.

6.1.3 Diverse Industry Producing a Wide Range of Chemical Wastes

The recently completed study of hazardous waste generation in the Minneapolis/St. Paul metropolitan area illustrated the diverse industry and wide range of chemical waste produced in the area.(1) The following table briefly summarizes the number of industries in Minnesota within the key industrial groups outlined in the grant applicant request. Detailed information on quantities and categories of hazardous waste generated by the various industries in the metropolitan area is included in Section 6.2.1.

SUMMARY OF KEY INDUSTRIES IN MINNESOTA

SIC	Products	Number of Industries in Minnesota
223 225 226 227 228 229	Textile Products	37
2815 2816 2819	Industrial Inorganic Chemicals	16
2821 3011 3069	Rubber and Plastics	
2831 2833 2834	Pharmaceuticals	32
2851	Paint and Allied Products	38
2861	Organic Chemicals	2
2879	Agricultural Chemicals	22
2892	Explosives	6
2911	Petroleum Refining	3
3111	Leather Tanning	2
3312 3313 3315 3317 3321 3322 3323 3341 3351 3352 3356 3357 3361 3362 3369 3391 3392 3399	Primary Metals	136

SUMMARY OF KEY INDUSTRIES IN MINNESOTA (cont.)

SIC	Products	Number of Industries in Minnesota
3741	Plating and Polishing	4
355 357	Machinery, Except Electrical	201
3691	Battery Manufacturing	7

As summarized in the preceding table, Minnesota is a major planting and metal finishing center (aluminum anodizing, cadmium, chrome, nickel, zinc and copper plating, cyanide complexing). The area also has several paint manufacturers (water and solvent base) and battery manufacturers including one of the few manufacturers of nickel-cadmium batteries in the United States. The state has three oil refineries with two located in the Minneapolis/St. Paul metropolitan area. The area is also a major center for the printed circuit industry.

Various mining companies are beginning to seek the necessary state and Federal permits to extract the large copper/nickel reserves in Minnesota. While it is doubtful that these ventures will be generating waste products during the life of the demonstration grant, it is likely that potentially hazardous waste products from smelting and refining of copper/nickel ores may be generated in Minnesota during the expected life of the chemical waste land disposal facility. Copper mining and benefaction is presently occurring in northern Michigan (approximately 250 miles from the Minneapolis/St. Paul metropolitan area). If awarded the demonstration grant, the applicant will cooperate with the State of Michigan and with the White Pine Copper Company to obtain a limited quantity of cooper benefication waste for use in the demonstration project.

Wood preservatives (pentachlorophenols) are the only organic chemical (SIC 286) known to be manufactured in Minnesota. Many industries, however, use various organic chemicals in their industrial processes and, therefore, organic chemicals are included in the hazardous waste stream. The applicant anticipates no problems in securing sufficient waste organic chemicals for study purposes.

There are no known pharmaceutical manufacturers in Minnesota, however, pharmaceutical formulators and, of course, users do exist. Formulators and users (such as hospitals, clinics, etc.) represent the applicant's source of pharmaceutical waste at this time. If awarded the demonstration grant, the applicant will contact the large pharmaceutical manufacturers to obtain a limited quantity of pharmaceutical manufacturing waste for use in the demonstration project.

In summary, the Minneapolis/St. Paul area has diverse industry producing a wide variety of candidate wastes for a chemical waste land disposal facility. The applicant is confident that limited quantities of the few wastes which may be in short supply can be obtained within a reasonable distance. Although hazardous waste incineration facilities are available in the state, a sufficient supply of flammable wastes will be diverted to the demonstration facility for demonstration purposes.

Also important is the fact that the Minneapolis/St. Paul area, as a major industrial center, does not exhibit the very complex waste generation characteristics symbolic of the "industrial mega-centers" in the eastern portion of the United States. The applicant believes the relatively isolated nature of the Minneapolis/St. Paul area as an industrial center represents an advantage. The geographical separation of the Minneapolis/St. Paul area from other waste generation centers make the evalution of the economic and social factors associated with the demonstration land disposal facility easier to evaluate and the supply of wastes easier to guarantee.

6.1.4 A High Level of Industrial Awareness

Minnesota industries have generally recognized the importance of good environmental management and have been willing to cooperate with the various regulatory agencies to seek solutions to waste disposal problems. Industries in Minnesota have demonstrated an awareness of hazardous waste disposal and have been supportive of the applicant's efforts to implement the various hazardous waste management programs. The state's largest industrial association, the Minnesota Associate of Commerce and Industry, has been working closely with the applicant and with the metropolitan area counties during the development and implementation of the various hazardous waste studies and programs including this grant application. The Minnesota Association of Commerce and Industry, along with various environmental groups, supported the applicant's hazardous waste legislation in the 1974 session of the Minnesota Legislature. If selected for the demonstration project, the Environmental Protection Agency and the applicant can expect a high degree of cooperation from the area's industries.

6.1.5 Good Road and Rail Access

The Minneapolis/St. Paul metropolitan area is served by excellent road, rail and barge systems. The good access to the area represents an opportunity to safely transport chemical wastes to this area from other portions of Minnesota. North-south and east-west interstate freeways and railway systems intersect in the Minneapolis/St. Paul area. The area is the northwestern terminal of the inland waterway system, and a number of barge terminals exist on the Mississippi, Minnesota and St. Croix Rivers. Minnesota is also reasonably centrally located within the country from east to west. This provides reasonable access to the area from any part of the country to view the facility.

6.1.6 Extreme Climatological Conditions

The Minneapolis/St. Paul area is "blessed" with extreme climatological conditions sufficient to provide data on the operation of a chemical waste land disposal facility applicable to most other areas of the country. The area is characterized by generally mild, subhumid summers and relatively long severe winters. Temperatures at St. Paul, for example, ranged from -34°F in January, 1936 and 1970, to 108°F in July, 1936. Monthly precipitation ranged from a trace in December, 1943 to 8.03 inches in May, 1962. Abrupt changes in temperature and precipitation are common.

The winter weather will enable the various construction and operation demonstrations to be conducted under severe conditions. Working with synthetic liners and placing wastes in the disposal area are but two of the demonstration processes which will require different techniques and, therefore, exhibit different unit costs during cold weather operation.

The hydrological conditions in the Minneapolis/St. Paul area are sufficient to generate leachate at the demonstration facility. The applicant is responsible for reviewing ground water monitoring data from a number of sanitary landfills in the area and the data indicates that leachate is generated. Average annual precipitation in the Minneapolis/St. Paul area is 28.3 inches.(2) Average annual evapotranspiration (actual) has been computed to be approximately 23 inches and average annual evapotranspiration (potential) has been computed to be approximately 24 inches.(2) The gross water balance, therefore, indicates that on the average, approximately 5 inches of water per year will be available for leachate production, assuming a plant cover over the land disposal facility. Transpiration from plants during the growing season (May-September) represents approximately 9 inches of the 24 inches of annual potential evapotranspiration. Therefore, in areas of the land disposal facility without plant cover, as much as 14 inches of available water per year can be expected to be generated for leachate production. The amount of water available for leachate production can be adjusted in this area by adding or removing snow as well as vegetation from the surface of the disposal facility. Artificial rainmaking facilities will also be provided over a portion of the facility to simulate extreme conditions which could occur in the Minneapolis/St. Paul area (as well as other areas of the country), but which might not occur during the demonstration period.

6.2 STATEWIDE NEED FOR A CHEMICAL WASTE LAND DISPOSAL FACILITY

The applicant believes that the State of Minnesota is ahead of the rest of the country in regulating and managing hazardous waste. As discussed previously, counties in the Minneapolis/St. Paul metropolitan area are implementing a program to license hazardous waste generators. After implementation of this regulatory program, generators will be required to obtain licenses from the appropriate county before moving hazardous wastes from their property. Industrial waste discharge pretreatment regulations are being promolgated by the Metropolitan Waste Control Commission which is the regional sanitary sewer authority in the Minneapolis/St. Paul metropolitan area. These regulations will limit the discharge of various hazardous wastes to the regional sewer system, thereby increasing the pressure on other disposal facilities. Thus, large quantities of hazardous wastes will be generated and identified and proper disposal facilities must be available if the overall hazardous waste management program is to work. As brought out in this section of the application, Minnesota needs a land disposal facility of the type envisioned in the demonstration project. The location of the facility in Minnesota will, therefore, not only satisfy a nationwide need, but will also alleviate a critical statewide need.

6.2.1 Area-wide Hazardous Waste Generation

Hazardous waste generation in the Minneapolis/St. Paul metropolitan area was quantified in a recent study completed for the metropolitan counties and for the applicant.(1) The quantities of hazardous wastes produced by various generators are summarized on page 6-12. As shown on page 6-12, approximately 38,000 tons of hazardous waste (non-oil) are generated annually in the metropolitan area. Of that total, approximately 27,000 tons/year are presently discharged to the sanitary sewer systems and 11,000 tons/year are disposed of using non-sewer facilities (incinerated, recycled, stored, illegally landfilled). Of the 11,000 tons/year of hazardous wastes disposed of through non-sewer routes, approximately 3,000 tons/year can be identified as being disposed of at regulated facilities. Thus, an estimated 8,000 tons/year of potentially hazardous wastes are presently being disposed of in an unregulated and, therefore, potentially unsafe manner.

The investigation of hazardous waste management indicated a general lack of effectiveness in the hazardous waste control system existing at the time of the study. This was caused by a combination of

POTENTIALLY HAZARDOUS WASTES GENERATED IN THE STUDY AREA

ANNUAL GENERATION

SIC	PRODUCT		POTENTIALLY HAZARDOUS WASTES — NON-OIL											OIL	
			FLAMMABLES		PAINT		POISONS		CHEM SLUDGE-NEC*		REACTIVE		TOTAL (NON-OIL)		
			TOTAL (LBS)	% NS	TOTAL (LBS)	% NS	TOTAL (LBS)	% NS	TOTAL (LBS)	% NS	TOTAL (LBS)	% NS	TOTAL (LBS)	TOTAL (LBS)	% NS
19	ORDNANCE	AVAILABLE DATA	312,000	100	400	100	5,000	0	750	100	31,750	0	369,900	277,200	36
		EXTRAPOLATED	711,000		25,000		25,000		27,000		129,000		977,600	105,000	
20	FOOD & KINDRED PRODUCTS	AVAILABLE DATA	7,700	76	1,000	100	35,820	1	35,000	100	495,000	7	574,520	57,000	Unknown
		EXTRAPOLATED	28,000		4,000		56,000		100,000		1,750,000		1,968,000	200,000	
22 & 23	TEXTILE PRODUCTS	AVAILABLE DATA	—	—	—	—	26,300	0	—	—	—	—	26,300	—	—
		EXTRAPOLATED					30,000						30,000	Unknown	
2491	WOOD PRESERVING	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED							270,000				270,000		
26	PAPER & ALLIED PRODUCTS	AVAILABLE DATA	75,700	27	18,400	100	6,900	58	18,300	100	3,300	0	122,600	—	—
		EXTRAPOLATED	630,000		19,000		23,000		312,000		10,000		994,000	120,000	
27	PRINTING & PUBLISHING	AVAILABLE DATA	31,600	35	—	100	59,900	83	20,000	100	8,900	0	120,400	278,500	0
		EXTRAPOLATED	179,000				124,000		99,000		21,000		423,000	3,110,000	
2815	CYCLIC INTERMEDIATES & CRUDES	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	·
		EXTRAPOLATED					132,000						132,000	16,000	
2816	INORGANIC PIGMENTS	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					5,000						5,000		
2819	INORGANIC CHEMICALS-NEC*	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					200				3,600,000		3,600,200		
2821	PLASTIC MATERIALS & RESINS	AVAILABLE DATA	173,300	100	—	—	—	—	41,200	100	—	—	214,500	17,000	0
		EXTRAPOLATED	361,000						87,000				448,000	41,000	
284	SOAP & TOILET PREPARATIONS	AVAILABLE DATA	*328,000	0	—	—	—	—	7,200	100	27,500	31	363,500	20,500	63
		EXTRAPOLATED	1,090,000						159,000		110,000		1,359,000	23,500	
2851	PAINTS & ALLIED PRODUCTS	AVAILABLE DATA	5,300,000	6	201,000	91	Included in Other Categories		215,000	100	200,000	0	5,916,000	96,100	0
		EXTRAPOLATED	6,000,000		500,000				1,000,000		240,000		7,740,000	2,230,000	
2871	FERTILIZERS	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					2,000				Unknown		2,000		
2879	AGRICULTURAL CHEMICALS - NEC*	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					3,500						3,500		
2891	ADHESIVES & SEALANT	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	4,700	0
		EXTRAPOLATED	60,000				5,000						65,000	10,000	
2893	PRINTING INK	AVAILABLE DATA	18,000	100	—	—	—	—	1,000	100	—	—	19,000	—	—
		EXTRAPOLATED	27,000				5,000		8,000		5,000		45,000		
2899	CHEMICAL PREPARATIONS - NEC*	AVAILABLE DATA	—	—	—	—	1,000	100	—	—	2,300	96	3,300	—	—
		EXTRAPOLATED	18,000				3,000				5,000		26,000	4,000	
2911	PETROLEUM REFINING	AVAILABLE DATA	—	—	—	—	14,000	100	—	—	106,000	100	120,000	456,000	100
		EXTRAPOLATED					21,000				159,000		180,000	694,000	
2952	ASPHALT FELTS & ROOFING	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	5,000	0
		EXTRAPOLATED	13,000										13,000	66,000	
2992	LUBRICATING OILS & GREASES	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED													
3079	MISC PLASTIC PRODUCTS	AVAILABLE DATA	1,000	0	—	—	45,800	100	—	—	15,000	100	61,800	25,900	58
		EXTRAPOLATED	96,500				135,000				135,000		366,500	67,600	
3111	LEATHER TANNING	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					16,000				Unknown		15,000		
336	BRASS, BRONZE, & COPPER CASTINGS	AVAILABLE DATA	7,500	100	—	—	421,600	84	40,000	100	80,600	100	549,700	5,600	71
		EXTRAPOLATED	26,200				576,000		57,000		115,000		774,200	308,000	
34	METAL PRODUCTS, EXCEPT 3471, 3479, & 3491	AVAILABLE DATA	192,000	100	311,300	26	293,800	63	29,800	100	214,800	87	1,041,700	375,700	20
		EXTRAPOLATED	1,560,000		2,160,000		1,950,000		200,000		1,580,000		7,450,000	2,500,000	
3471	PLATING & POLISHING	AVAILABLE DATA	4,600	100	—	—	445,000	2	4,800	87	3,245,000	100	3,699,400	113,100	0
		EXTRAPOLATED	21,900				604,000		6,200		4,540,000		5,172,300	163,000	
3479	METAL COATING	AVAILABLE DATA	156,400	100	3,600	100	34,050	27	18,000	100	166,400	82	378,450	18,300	2
		EXTRAPOLATED	291,000		6,800		63,000		36,200		278,000		675,000	30,800	
349	METAL BARRELS	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED							650,000		131,000		781,000	5,000,000	
35	MACHINERY, EXCEPT ELECTRICAL	AVAILABLE DATA	701,700	100	177,300	89	249,600	46	435,000	100	428,900	61	1,966,700	1,882,300	36
		EXTRAPOLATED	5,341,000		1,194,000		1,165,000		2,820,000		3,174,000		13,694,000	11,070,000	
36	ELECTRICAL EQUIPMENT, EXCEPT 3679 & 3691	AVAILABLE DATA	267,400	100	11,930	100	72,200	10	626,800	100	69,800	0	1,048,130	131,100	89
		EXTRAPOLATED	1,520,000		67,500		154,000		3,540,000		394,000		5,676,500	740,000	
3679	ELECTRICAL COMPONENTS (PRINTED CIRCUITS)	AVAILABLE DATA	1,400	100	—	—	27,600	0	—	—	11,200	0	40,200	3,900	35
		EXTRAPOLATED	14,700		41,200		635,000		[illegible]		7,440,000		[illegible]	[illegible]	
3691	BATTERY MANUFACTURING	AVAILABLE DATA	—	0	—		700	0	—	—	—	—	700	—	—
		EXTRAPOLATED					15,500				Unknown		15,500		
37	TRANSPORTATION EQUIPMENT	AVAILABLE DATA	4,500	100	2,000	100	400	0	1,000	100	116,800	100	124,700	6,100	40
		EXTRAPOLATED	650,000		156,000		156,000		468,000		650,000		2,100,000	3,250,000	
38	MEASURING, ANALIZING, & CONTROLLING INSTRUMENTS	AVAILABLE DATA	41,900	100	30,200	100	31,000	14	1,600	100	46,800	0	151,500	38,700	31
		EXTRAPOLATED	1,780,000		137,000		138,000		62,000		282,000		2,399,000	164,000	
3941	TOY MANUFACTURING	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED	151,000		[illegible]				24,000		468,000		967,000	[illegible]	
3993	SIGNS & ADVERTISING	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED							264,000				264,000	12,000	
40	RAILROAD MAINTENANCE	AVAILABLE DATA	—	—	—	—	—	—	—	—	2,316,000	100	2,316,000	—	—
		EXTRAPOLATED	Unknown				Unknown				2,503,000		2,503,000	Unknown	
[illegible]	PIPELINE MAINTENANCE	AVAILABLE DATA	—	—	—	—	—	—	106,000	100	—	—	106,000	—	—
		EXTRAPOLATED					Unknown		150,000				150,000	Unknown	
[illegible]	FUEL COMBUSTION	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					[illegible]						[illegible]		
51	WHOLESALE CHEMICAL SALES	AVAILABLE DATA	—	—	—	—	—	—	65,000	100	—	—	65,000	—	—
		EXTRAPOLATED							130,000				130,000		
[illegible] 75	[illegible] AUTOMOTIVE REPAIR	AVAILABLE DATA	—	—	—	—	—	—	18,000	100	—	—	[illegible]	—	—
		EXTRAPOLATED							1,200,000				1,200,000	35,000,000	
7395	PHOTOFINISHING LABS	AVAILABLE DATA	—	—	—	—	—	—	17,000	0	—	—	17,000	—	—
		EXTRAPOLATED							20,000				20,000		
806	HOSPITALS	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED					[illegible]						2,500,000		
822	COLLEGES & UNIVERSITIES	AVAILABLE DATA	[illegible]	100	—	—	—	—	88,000	100	[illegible]	100	[illegible]	—	—
		EXTRAPOLATED	92,000						99,000		3,000		[illegible]	Unknown	
MISC	HIGHWAY MAINTENANCE	AVAILABLE DATA	26,000	100	—	—	—	—	—	—	—	—	26,000	—	—
		EXTRAPOLATED	226,000										226,000	Unknown	
MISC	DISCARDED CONTAINERS	AVAILABLE DATA	—	—	—	—	—	—	—	—	—	—	—	—	—
		EXTRAPOLATED			1,900,000		3,000						1,903,000	Unknown	
	TOTALS	[illegible]	[illegible]		757,310		[illegible]		1,919,[illegible]		[illegible]		20,362,[illegible]	[illegible]	
		[illegible]	20,[illegible]		[illegible]		[illegible]		11,[illegible]		27,729,[illegible]		75,253,[illegible]	[illegible]	
		[illegible]	[illegible]		3,359		[illegible]		5,834		13,967		[illegible]	[illegible]	

NEC* – Not Elsewhere Classified

% NS – percent of potentially hazardous waste (available data) disposed of through non-approved methods

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circumstances including the lack of a specific definition of the term hazardous waste and a lack of adequate hazardous waste disposal facilities. Case studies were documented illustrating that public health and the environment were being threatened by the uncontrolled disposal of potentially hazardous waste. Typical Minnesota case studies are included in Appendix G of this application. As standards and regulations begin to decrease the availability of water and air as disposal media, hazardous waste generators can be expected to turn increasingly to land disposal as a means of solving their hazardous waste problems. The study concluded that problems associated with the disposal of hazardous waste could be expected to increase in the future if an effective hazardous waste management program was not implemented.

6.2.2 State Hazardous Waste Management Program

Legislation to implement the recommendations of the hazardous waste generation report was passed by the 1974 session of the Minnesota Legislature. The new legislation along with the previously existing legislation is now sufficient to regulate the classification, transportation, storage, treatment and disposal of hazardous waste on a statewide basis. Legislation applicable to the statewide hazardous waste regulatory program is included in Appendix A of this grant application. The legislation will lead to the following regulatory agency responsibilities:

a) County or Multi-County Agencies

    i) Prepare a county or multi-county hazardous waste management plan. The plan could be an amendment to the existing solid waste management plan and will include an identification of potential generators, categories and quantities of hazardous waste generated within the county planning area and procedures for accident notification consistent with the Statewide Hazardous Spill Contingency Plan.

ii) Adopt ordinances relative to hazardous waste generation, licenses and license fees; hazardous waste classification, labeling, transportation, and treatment/disposal facilities consistent with hazardous waste regulations, model ordinances and guidelines prepared by the applicant. The ordinances could be amendments to the existing county solid waste ordinances.

iii) Review and issue hazardous waste generator licenses to generators of hazardous waste. Enforce conditions of the license relative to classification, safe handling, labeling, transportation, on-site storage and safety requirements using the enforcement powers of the ordinance. Distribute license applications and hazardous waste container labels to generators. Answer routine questions regarding the hazardous waste management program relative to classification, labeling and management responsibilities. Collect hazardous waste generator license fees to cover the county administrative costs associated with administering the generator licensing program.

iv) Review and issue licenses for hazardous waste treatment/disposal facilities in the same manner that county sanitary landfill licenses are presently issued. Enforce conditions of the license using the enforcement powers of the ordinance.

v) Trace improperly labeled, but potentially hazardous waste arriving at approved or nonapproved treatment/disposal facilities.

vi) Conduct an annual inventory of the quantities and categories of hazardous waste generated in each county planning area. Transmit this information semi-annually to the applicant and to the appropriate regional planning agency.

b) Regional Planning Agency

i) Review and approve county hazardous waste plans, ordinances and licensing procedures.

ii) Prepare a Regional Hazardous Waste Management Plan including the designation of the hazardous waste treatment/disposal facilities to serve the region.

iii) Prepare an annual inventory of the quantities, categories and disposal locations of hazardous waste generated in the region.

c) State - Pollution Control Agency (Applicant)

i) Review and approve county and regional hazardous waste management plans, ordinances, licensing procedures and inventories.

ii) Develop a Statewide Hazardous Waste Management Plan detailing the location of hazardous waste treatment/disposal facilities and temporary storage sites throughout the state and the need for interstate transportation of hazardous waste. The Statewide Hazardous Spill Contingency Plan will also be integrated into the State Hazardous Waste Management Plan.

iii) Promulgate statewide hazardous waste regulations concerning the classification, labeling, temporary storage, collection, handling, transportation, treatment and disposal of hazardous wastes. Develop guidelines detailing the specific selection criteria to be used to identify hazardous wastes and develop model ordinances for use by the counties.

iv) Print and distribute waste generator license applications to potential hazardous waste generators. Receive the completed application, check the information for completeness and distribute the appropriate portions of the application to the county hazardous waste generator licensing agency and to the regional or local sanitary sewer agency (if applicable).

v) Review the waste generator licenses before issuance by the county generator licensing agency and exercise veto power if the license violates State Hazardous Waste Regulations. Depending on staff limitations, the state may only review hazardous waste generator licenses from major generators.

vi) Assist the counties in answering routine questions regarding the hazardous waste management program. Answer non-routine questions regarding the hazardous waste management program and the classification of various wastes as hazardous or nonhazardous. Incorporate training courses relating to hazardous waste classification, labeling, handling, storage, and transportation into the overall solid waste operator training program.

vii) Issue hazardous waste treatment/disposal site facility permits, review and periodically check the monitoring results supplied by the hazardous waste treatment/disposal facilities regarding the quality of effluents released to the environment and enforce other conditions of the permits relative to handling, storage, treatment and disposal of hazardous waste at the treatment/disposal facility.

viii) Conduct an annual inventory of hazardous waste quantities generated throughout the state.

d) State - Public Service Commission

i) Incorporate a hazardous waste transportation licensing system into the existing hazardous materials transportation licensing procedures using the technical assistance of the applicant and the Federal Department of Transportation.

ii) Enforce the hazardous waste transportation license through existing Public Service Commission transportation enforcement procedures.

e) State - Department of Administration

Print and sell hazardous waste labels to generators and to the county licensing agencies. This will insure uniformity in hazardous waste labeling.

At the time of this grant application, the multi-county joint power agency in the Minneapolis/St. Paul metropolitan area has prepared a model county hazardous waste regulation ordinance (Appendix C) and is in the process of preparing a multi-county hazardous waste management plan. The regional planning agency has adopted interim hazardous waste management policies for incorporation into the regional solid waste management plan. The applicant has requested consultant proposals for developing a Statewide Hazardous Waste Management Plan and has prepared a draft of the State Hazardous Waste Regulations. After adoption of the county hazardous waste ordinances by the counties and the State Hazardous Waste Regulations by the applicant, the counties will begin issuing hazardous waste generator licenses and the hazardous waste management program will be underway in the metropolitan area and eventually statewide.

6.2.3 Existing Hazardous Waste Management Facilities

At the present time, there are four known hazardous waste disposal facilities (non-radioactive wastes) serving Minnesota. Two of the facilities are located within the Minneapolis/St. Paul metropolitan area and are regulated by the applicant. The other two are out-of-state facilities known to collect hazardous waste from Minnesota. The existing facilities are summarized in the following paragraphs. The estimated quantities of hazardous waste deposited at these facilities between September 1, 1972 and August 31, 1973, are summarized on page 6-19.

a) Pollution Controls, Inc. - Scott County - Pollution Controls, Inc. operates a hazardous waste incinerator with a reported capacity of 12,000,000 gallons/year (60,000 tons/year at 10 lbs./

gallon). The facility has air, water and solid waste permits from the applicant and a solid waste license from Scott County. The facility has been in continuous operation since 1971.

b) Minnesota Mining and Manufacturing Co. - Washington County - Minnesota Mining and Manufacturing Co. owns and operates an incinerator. The incinerator is regulated by air, water and solid waste permits from the applicant and by a solid waste license from Washington County. The facility is used only to dispose of waste generated by Minnesota Mining and Manufacturing Co. and is not available for use by other generators. Data regarding the generation and disposal of hazardous waste at the Minnesota Mining and Manufacturing Co. incinerator is not available for publication.

c) Waste Research and Reclamation Co., Inc. - Eau Claire, Wisconsin - Waste Research and Reclamation Co., Inc. recycles solvents, oils and forging compounds. The estimated volume of hazardous waste transported out of the study area by Waste Research and Reclamation Co., Inc. was estimated using data collected by an industrial waste survey and by direct communication with the staff of Waste Research and Reclamation Co., Inc.

d) Conversion Chemical Corporation - Gary, Indiana - Conversion Chemical Corporation transports contaminated acids from the printed circuit industry out of the Minneapolis/St. Paul metropolitan area. The estimated volume of acid wastes transported out of the study area by Conversion Chemical Corporation was obtained through direct communications with the staff of Conversion Chemical Corporation.

In addition to the four disposal facilities currently disposing of hazardous waste from Minnesota, two additional facilities were in operation a short time ago. During 1973, use of these two facilities was abandoned in conformance with the applicant's Solid Waste Rules and Regulations. These two facilities are:

1. Waste Disposal Engineering Sanitary Landfill - Anoka County - The Waste Disposal Engineering Sanitary Landfill was the only landfill in the metropolitan area with a permitted on-land hazardous waste disposal site. At

one time, the facility had an operating permit from the applicant and an operating license from Anoka County. Under the newly adopted state Solid Waste Rules and Regulations, on-land disposal of hazardous waste is no longer permitted at sanitary landfills and this on-land disposal facility has been abandoned.

2. University of Minnesota - Dakota County - Until mid 1973, the University of Minnesota maintained a small on-land hazardous waste disposal site at the University of Minnesota Rosemount Research Facility. The waste disposal facility was viewed as an experimental facility and was not regulated through a permit from the applicant or through a license from Dakota County. Leachate from the site and ground water beneath the site are monitored by the University. Use of the land disposal area has been discontinued.

The hazardous waste quantities from the Minneapolis/St. Paul metropolitan area being deposited at the six disposal areas discussed in the preceding paragraphs are summarized on the following table. The waste disposal quantities for Pollution Controls, Inc.'s incinerator and Waste Disposal Engineering's on-land disposal facility were obtained from monthly reports submitted to the applicant. The quantity of waste deposited at the University of Minnestoa facility was obtained from a staff member of the University Plant Services Department. As discussed previously, no data is available for publication from Minnesota Mining and Manufacturing Co. with regard to the quantity of hazardous waste being disposed of at their incinerator.

NON-SEWERED DISPOSAL OF HAZARDOUS WASTE FROM MINNEAPOLIS/ST. PAUL AREA

Name of Facility	Type of Disposal	Estimated Disposal Quantity (9/1/72-8/31/73)	Wastes
Pollution Controls, Inc. (Minneapolis/St. Paul)	Incinerator	340,200 gallons	Solvents, Paint, Ink, Chemical Sludge
*Minnesota Mining & Manufacturing Co. (Minneapolis/St. Paul)	Incinerator	Not Available	Company Wet Scrap and Security Dry Scrap

NON-SEWERED DISPOSAL OF HAZARDOUS WASTE FROM MINNEAPOLIS/ST. PAUL AREA (cont.)

Name of Facility	Type of Disposal	Estimated Disposal Quantity (9/1/72-8/31/73)	Wastes
Waste Research & Reclamation (Eau Claire, Wisc.)	Recycling	150,000 gallons	Solvents
Conversion Chemical Corporation (Gary, Indiana)	On-land	55,000 gallons	Acids
**Waste Disposal Engineering (Minneapolis/St. Paul)	On-land	17,500 gallons	Solvents, Paints, Ink, Chemical Sludge
**University of Minnesota (Minneapolis/St. Paul)	On-land	7,300 gallons	Research Chemicals, Acids

*Only available for company waste.

**Abandoned in 1973 in conformance with Minnesota Pollution Control Agency Solid Waste Regulations.

Source: Hazardous Waste Generation - Twin Cities Metropolitan Area(1)

The State of Minnesota Public Service Commission regulates and licenses the for-hire bulk carrying of most hazardous substances. The Minnesota Public Service Commission routinely adopts the Federal Department of Transportation's hazardous substances transportation regulations for use in the intrastate transportation of hazardous materials in bulk. The Public Service Commission is in the process of incorporating a hazardous waste transportation licensing system into the existing hazardous materials transportation licensing procedures using the technical assistance of the applicant. The hazardous waste transportation licensing system will be enforced by the Public Service Commission through existing transportation enforcement procedures.

At the present time, hazardous waste is being transported by a number of private haulers. Pollution Controls, Inc., for example, maintains seven tankers (5,000 gallon capacity each) and five 40 foot long vans for transporting hazardous waste to their incinerator. Septic tank scavengers have also been known to transport liquid hazardous wastes. Hazardous wastes are also commonly transported in 55 gallon drums on flat bed trucks. Once the hazardous waste transportation licensing system is implemented, the transportation of hazardous wastes will be much more closely regulated.

As discussed in this section, Minnesota is well on the way toward a program of environmentally-safe hazardous waste management. Hazardous waste generation, labeling, storage, handling, treatment and disposal can be effectively regulated under the proposed program. In addition, the area-wide incineration capabilities are sufficient to dispose of the hazardous wastes from the area which can be safely incinerated. Incineration is, however, obviously not the disposal answer for all types of hazardous wastes. Other modes of disposal, such as land disposal under carefully controlled and monitored conditions, are urgently needed to make the statewide hazardous waste management program effective. An environmentally-safe land disposal facility will also demonstrate the true cost of environmentally-safe waste disposal. Once this true cost is known, the applicant anticipates that resource recovery and source reduction programs will be more economically attractive. Without adequate disposal facilities, the overall hazardous waste regulatory system simply will not function. The location of the demonstration facility in Minnesota will, therefore, not only satisfy a nationwide need to demonstrate the feasibility of the on-land disposal of chemical wastes, but will also alleviate a critical statewide need to provide environmentally-safe disposal for many of the state's hazardous wastes.

6.3 SITE SELECTION

This section of the demonstration grant application illustrates the procedures the applicant utilized to select the site for the demonstration facility. The section is divided into an overview of the applicant's general site location and environmental protection philosophy, a discussion of the site selection criteria used to screen perspective sites, a discussion of alternative sites considered by the applicant and an overview of the two sites selected as potential locations for the demonstration facility. More detailed information regarding the two selected sites is included in the Environmental Impact Appraisals in Section 7 and Section 8 of this application.

6.3.1 General Overview

The applicant considers the selection of an environmentally-safe site in terms of ground water quality protection, surface water quality protection, and air quality protection to be imperative. Even though one of the demonstration project objectives is to design and construct a chemical waste land disposal facility that can be built in many locations, the applicant believes that an environmentally-safe site must be selected and for that reason a great deal of attention has been given to environmental protection criteria. The following philosophy has been used by the applicant to provide an environmentally-safe site for the chemical waste land disposal facility. Primary protection of the ground water system will be provided by the various demonstration techniques prohibiting leachate escape and leachate generation. Liners, either in the form of barriers or membranes, will be placed under all chemical waste disposal areas. Leachate collection systems will be installed above the various liners to collect and remove all leachate. Primary protection to surface waters will be provided by diverting all tributary surface runoff around the facility and collecting and storing all surface runoff from the facility. Air quality protection will be provided by locating the facility away from populated areas and by screening and other techniques to reduce wind movement across the disposal area.

Due to the experimental nature of the demonstration project, however, the applicant recognizes that leachate leakage may occur through the primary leachate protection barriers. To provide a secondary leachate control barrier, the disposal area will be lined with a compacted colloidal clay barrier (permeabilities in the range of 10^{-9} cm/sec.) overlain by clean sand (permeabilities in the range of 1 cm/sec.). The clay barrier will be sloped to a secondary leachate collection system placed in the clean sand. In this way, any leachate leaking through the primary barriers will be collected in the secondary collection system before reaching the ground water table. A typical cross-section through the disposal area illustrating the chemical waste, primary barrier and leachate collection system, and secondary barrier and leachate collection system is shown on Figure 6-1.

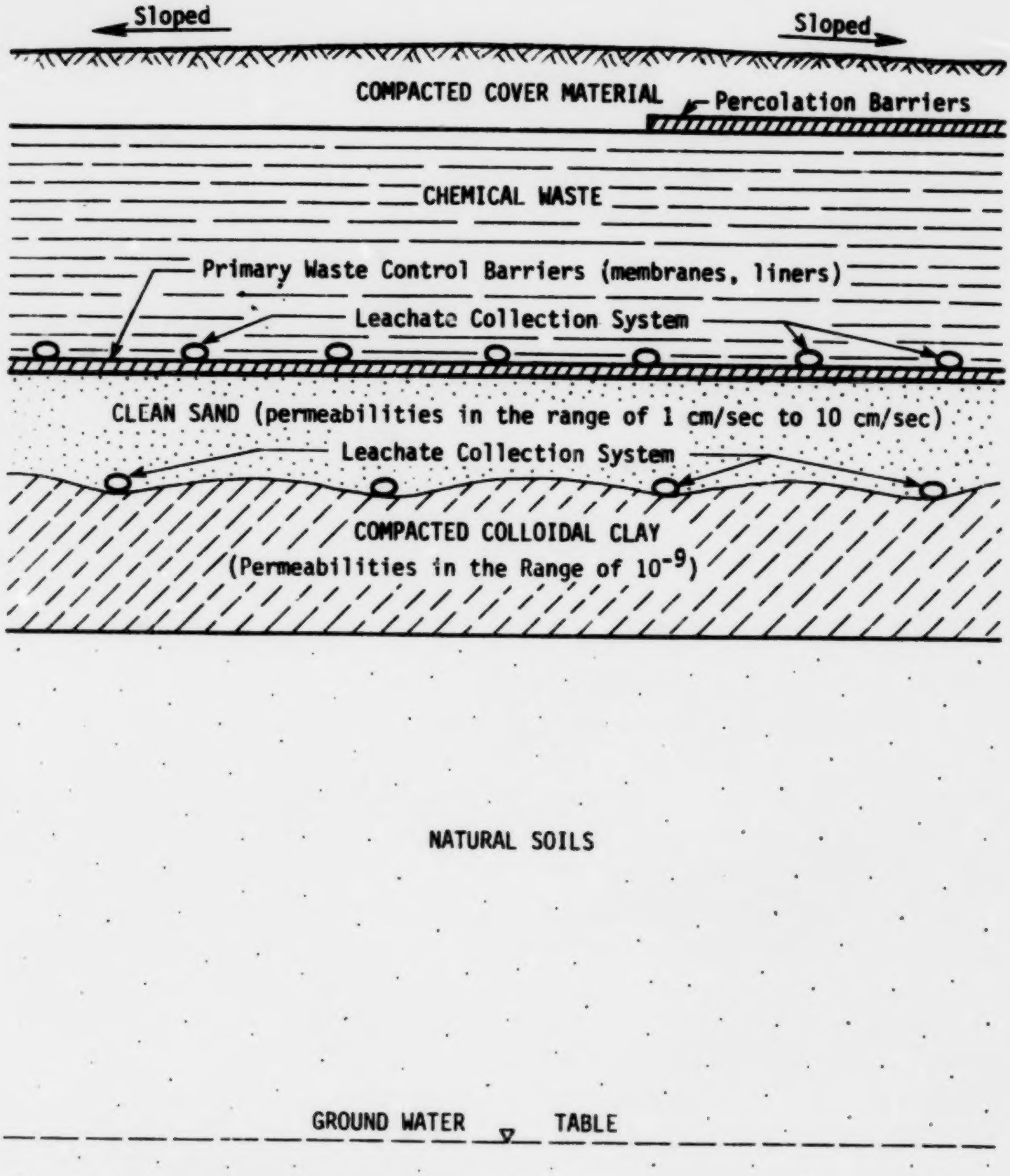

Sloped
Sloped
COMPACTED COVER MATERIAL
Percolation Barriers
CHEMICAL WASTE
Primary Waste Control Barriers (membranes, liners)
Leachate Collection System
CLEAN SAND (permeabilities in the range of 1 cm/sec to 10 cm/sec)
Leachate Collection System
COMPACTED COLLOIDAL CLAY
(Permeabilities in the Range of 10-9)
NATURAL SOILS
GROUND WATER TABLE

FIGURE 6-1

TYPICAL CROSS SECTION THROUGH DISPOSAL AREA
SHOWING PRIMARY AND SECONDARY WASTE
CONTROL BARRIERS

In a recent report completed for the U.S. Environmental Protection Agency, Battelle Pacific Northwest Laboratories recommended that hazardous waste disposal sites be located so natural soils act as a secondary barrier to unplanned waste releases.(6) The Battelle report indicated that clay soils were desirable due to their low permeabilities and high ion exchange capacities. The applicant believes, however, that in this area, typical glaciated clay soils do not guarantee an environmentally-safe facility for the following reasons:

a) Clay soils in this area typically exhibit secondary joint patterns likely due to periodic shrink and swell during the post-glacial period. Percolation rates through these secondary joints may be many orders of magnitude greater than percolation rates through the unjointed clay soils. The secondary joints may, therefore, provide a route for leachate movement downward and away from the facility.

b) If clay soils became contaminated by leachate movement through the secondary joints, the leachate will be extremely difficult to remove. Traditional methods of recovery, such as recovery wells, may not be effective and excavation may be the only feasible method of removing the leachate.

c) Due to their geologic history, the glacial tills containing the clay soil in this area are not homogeneous. In one of the most promising search areas in the southwestern portion of the metropolitan area, forty to sixty feet of clay soil is typically underlain by ten to twenty feet of sand and gravel used for individual farm water supplies. This sand and gravel aquifer has the potential to become contaminated by leachate moving through the secondary joints in the overlying clay. Water supply wells between the facility and the ground water discharge zone, therefore, have the potential of becoming contaminated in the future if leachate accidentally escapes from the facility.

d) Since precipitation exceeds evapotranspiration in this area, clay soils are typically accompanied by a water table near the ground surface. If a land disposal area is excavated beneath the water table in these soils, a slow inflow of ground water will occur beneath the primary waste control barriers and the effectiveness of the various liners will be difficult to evaluate.

As an alternative to placing the disposal facility randomly in the glacial clay till, the applicant has established criteria which give priority to locating the facility near a ground water discharge area. The reason for giving priority to locations adjacent to ground water discharge areas is to insure protection of underlying water supply aquifers if the primary and secondary waste control barriers prove ineffective at some future date. Since no areas of clay soil adjacent to a ground water discharge area were located, priority was given to locating the facility in permeable soils to facilitate the removal of leachate through barrier wells if the primary and secondary leachate control barriers are for some reason ineffective in controlling leachate. Permeable soil such as glacial outwash was believed to be superior to silty clays or silty sands in facilitating leachate recovery.

The applicant believes that the resulting primary and secondary waste control barriers and leachate collection systems, the ability to use barrier wells to recover leachate plus the location of the facility adjacent to a ground water discharge area will provide an environmentally-safe facility while still demonstrating a facility design that could be used at a number of locations across the country under various geologic conditions.

6.3.2 Site Selection Criteria

The following site selection criteria were used to screen perspective sites for the chemical waste land disposal demonstration facility.

a) Size Criteria

In order to provide land disposal capacity for a 15 to 20 year period, approximately 30 to 40 acres are estimated to be necessary for actual land disposal area, 5 acres are needed for buildings and parking, 20 to 30 acres are needed for waste storage and preparation, and 30 to 40 acres are needed for buffer zones and screening. Therefore, between 85 acres and 115 acres of land will be needed for the demonstration project.

b) Location Criteria

i) The site should be reasonably near the existing chemical waste generation centers.

ii) The site should be located on major highway routes, perferably on highway routes being used to transport solid waste and chemical materials and have rail access.

iii) The site should be near the existing hazardous waste incinerator to improve the efficiency of the overall metropolitan area hazardous waste management program.

iv) The site should be in an area served by a regional wastewater treatment plant so the treatment plant can be used to dispose of leachate, contaminated surface water and waste preparation supernatents which may be generated at the site.

v) The site should be well away from residential areas and well screened from roads, surrounding buildings, etc. The facility should not be located adjacent to recreational areas, parks, and high-intensity public use areas. Residential and high-intensity public use areas should not be programmed to be constructed in surrounding areas during the life of the facility.

vi) The site should be located in an area served by an adequate power supply (220 volt-3 phase for pumps and other heavy equipment) and water supply (either municipal or an aquifer capable of supplying 200 gpm for fire protection purposes).

c) Environmental Impact Criteria

i) The area should be sufficiently above the ground water table to demonstrate the feasibility of operating the site with a trench and fill waste placement technique (5-foot minimum trench depth). A 10-foot minimum freeboard between the ground water table and the bottom of the lowest portion of the fill area is necessary and a greater freeboard is desirable to give sufficient flexibility in site design, operation and environmental surveillance.

ii) Soils underlying the site should be sufficient to structurally support the land disposal of chemical waste. Homogeneous soils in terms of permeability, porosity, and soil structure are preferred in order to minimize differential settlement. Permeable, homogeneous soils have a higher priority than silt or sandy clay to provide fail-safe ground water protection facilities.

iii) Bedrock beneath the site should not be subject to subsidence and, if impacted by an unexpected leachate release, should be homogeneous and nonfractured in order to facilitate the fail-safe collection of unexpected escaped leachate.

iv) The site should be outside the standard project flood plain. A 10-foot freeboard between the standard project flood plain elevation and the bottom of the fill area is a minimum and a greater separation would be desirable.

v) Due to the short time period available to complete the grant application, reasonably sufficient background data should be available or easily attainable. Of particular interest will be data on soils, ground water, bedrock, vegetation, air quality, surface water and surrounding land use.

vi) The site should be located reasonably close to a ground water discharge area. Ground water within 2,000 feet of the area influenced by the site should not be used for individual potable water supply purposes or for commercial/industrial purposes affected by the accidental release of leachate now or in the future. The discharge area adjacent to the site should be downstream of the Minneapolis/St. Paul municipal water intakes.

vii) The facility should be located in an area of low flora and fauna uniqueness and diversity so that facility operation will have a low potential for damaging adjacent ecological systems.

viii) Surface slopes in the disposal area should be between 1 percent and 10 percent. Slopes less than 1 percent have poor drainage potential and slopes greater than 10 percent have high erosion potential.

d) Ownership Criteria

The site must be governmentally owned (non-federal) or able to be placed in governmental ownership within a reasonable cost.

e) Institutional Criteria

Institutional arrangements should be achievable to make the use of the site realistic.

6.3.3 Alternative Sites

The site selection criteria outlined in Section 6.3.2 were used to locate a number of alternative sites for the land disposal facility. Throughout the site selection process, efforts were made to consider only sites with some form of built-in environmental protection due to the recognized finite life of the various artificial membranes which may be utilized in at least a portion of the facility. As discussed in Section 6.3.1, built-in environmental protection in the form of locating the facility in clay soils and locating the facility near a ground water discharge area were evaluated. Of these two forms of environmental protection, the location of the facility near a discharge area and the close control over the ground water area influenced by the facility were considered to be the most environmentally fail-safe. An environmentally fail-safe operation will be absolutely necessary to gain acceptance for the project from local, regional and state units of government and from the general public.

6.4 DISPOSAL AREA PREPARATION TECHNIQUES

The purpose of this section of the grant application is to outline the various disposal area preparation techniques that will be evaluated for incorporation into the final design of the facility. Specific processes within the following four general disposal area preparation techniques will be evaluated.

- Techniques Prohibiting Leachate Escape
- Techniques Prohibiting Leachate Production
- Leachate Collection and Recirculation/Treatment Techniques
- Waste Placement Techniques

The following subsections discuss the various processes within each technique that will be evaluated and the evaluative criteria that will be used to select the final processes.

6.4.1 Techniques Prohibiting Leachate Escape

Various bottom liners to prevent the escape of leachate from the chemical waste land disposal facility will be evaluated. Bottom liners can be classified as synthetic membranes (such as polyvinyl chloride and polethelene sheets) which rely on thin impermeable material for protection and barriers (such as asphaltic concrete and soil-clay mixtures) which rely on low permeabilities and thickness for protection. A number of possible bottom liners for sanitary landfills have been identified in a recent study completed for the Environmental Protection Agency.(3) In addition, research studies evaluating various liners exposed to hazardous waste sludges are currently being conducted by the Environmental Protection Agency.(5) The liners found most feasible for use with chemical wastes in these studies as well as other bottom liners identified in other on-going studies will be evaluated for incorporation into the demonstration project by the applicant, by the land disposal facility operator and their subcontractors using the following criteria:

a) Stability of the liner material to the chemical and physical conditions expected in the disposal facility.

b) Cost and availability of the liner material.

c) Application, splicing, handling and storage characteristics.

d) Ability of the material to prohibit the movement of leachate.

Typically, the applicant, after consulting with the operator and with the Environmental Protection Agency, will propose various demonstration related activities to the operator. The facility operator will then design the demonstration areas within a proposed budget and the design will be approved by the applicant. A more detailed discussion of the applicant/operator responsibilities is outlined in Section 6.7.2.

It is anticipated that between 4 and 6 of the most promising bottom liners will be chosen with the concurrence of the Environmental Protection Agency for initial use in the demonstration facility. Some form of bottom liner will be used under all land disposal areas to insure leachate containment and facilitate leachate collection. The selected bottom liners will be placed on adjacent demonstration areas, perhaps 2 to 3 acres in size. Chemical waste will then be placed over the demonstration area using the various waste placement techniques selected using the procedures outlined in 6.4.4. A primary leachate collection system will be provided above the various bottom liners to collect leachate generated by the facility. As discussed in Section 6.8.3, a grid system will be established for the fill area and careful records will be kept of the types of liners placed beneath the various demonstration areas in the land disposal site.

As outlined in Section 6.3.1, the various bottom liners will be placed over a layer of clean sand and a layer of colloidal clay. The clay will provide a barrier to stop any leachate seeping through the demonstration bottom liners. The escaping leachate will be collected by a secondary leachate collection system constructed in the clean sand. The effectiveness of the various liners in preventing leachate escape will be monitored through the use of monitoring piezometers, suction lysimeters, conductivity probes, the secondary leachate collection system and other appropriate monitoring methods installed in the sand layer below the bottom liners, but above the clay barriers. Each demonstration area will have its own primary and secondary leachate monitoring system so the effectiveness of each liner used in each demonstration area can be carefully monitored. Special attention will be devoted to evaluating the performance of splices. As the performance data becomes available on the initial group of liners, this data as well as data generated by laboratory, bench scale, pilot scale and other full scale test projects will be used to select liner materials for further study in the demonstration project as the disposal areas are expanded. The performance of the bottom liners under the climatic conditions experienced in Minnesota will provide data applicable to other areas of the country.

6.4.2 Techniques Limiting Leachate Production

The effectiveness of various sealants designed to prevent the percolation of precipitation into the waste material will also be demonstrated. Sealants to prevent percolation and the resulting production of leachate can also be classified as synthetic membranes and barriers. The various liners studied in previous laboratory and bench scale projects will be evaluated for use in the demonstration project as percolation prohibitors.(3) (5) The evaluation of sealants for incorporation into the facility will be carried out by the applicant, the facility operator, and their consultants as discussed in 6.7.2 using the following evaluative criteria:

a) Stability of the sealant to sunlight and to the freeze/thaw and moisture conditions expected near the surface of the land disposal area.

b) Cost and availability of the sealant material.

c) Application, splicing, handling and storage characteristics.

d) Ability of the material to prevent the downward percolation of rainfall and melting snow.

It is anticipated that 3 or 4 of the most promising percolation prevention materials will be selected with the concurrence of the Environmental Protection Agency for initial use in the demonstration project. The sealant materials will be placed over adjacent 1 or 2 acre demonstration areas (perhaps areas without chemical waste or chemical waste disposal areas with bottom liners which have been used for other demonstrations could be used). The effectiveness of the various sealants in preventing the percolation of precipitation will be monitored using suction lysimeters, resistivity probes and other suitable monitoring devices placed beneath the sealants. The performance of the splices in the various sealants will be carefully monitored.

As the downward percolation of precipitation is prevented, the management of the resulting large volume of surface runoff will become a critical factor. Alternative methods of controlling surface runoff will be demonstrated. The applicant and facility operator will evaluate the possibility of covering various percolation sealants with topsoil and plants with high water consumption characteristics to reduce the volume of water which must be removed from the surface of the demonstration area. As data on the performance of the rainfall percolation sealants becomes available, this data along with data generated in other studies will be used to select rainfall percolation sealants for further study in expansion areas of the demonstration facility.

6.4.3 Leachate Collection and Recirculation/Treatment Techniques

Various leachate collection systems and leachate recirculation/treatment processes will be evaluated for incorporation into the demonstration project by the applicant, facility operator and their consultants.

Leachate collection facilities will concentrate upon collecting the leachate before the leachate reaches the ground water table. As discussed in 6.4.1, this necessitates the use of some form of liner under all land disposal areas. As discussed previously, a primary leachate collection system will be constructed immediately above all bottom liners. The purpose of the primary leachate collection system is to monitor the quality of leachate generated by the facility. A secondary leachate collection system will be installed below the bottom liner and above the clay waste control barrier. The purpose of the secondary leachate collection system is to collect all leachate seeping through the various liners used in the demonstration project, thereby providing an additional level of environmental protection and helping to evaluate the effectiveness of the various liners.

Leachate collection techniques to be evaluated will include drain tile and porous media as well as other leachate collection techniques found to be applicable to the chemical waste land disposal facility. Evaluation of various leachate collection facilities will be based upon the following criteria:

a) Stability of the leachate collection facilities when exposed to the expected quality of the leachate for long periods of time.

b) Cost of purchasing and installing the leachate collection facilities.

c) Ability of the facilities to effectively collect and transport leachate on a long-term basis.

It is anticipated that at least 3 or 4 different leachate collection techniques will be utilized with the concurrence of the Environmental Protection Agency in the various portions of the land disposal areas. Some form of leachate collection will be utilized under all the chemical waste land disposal demonstration areas. This is necessary to demonstrate leachate collection technology, to serve as an important part of the leachate quality and leachate quantity monitoring system, and as a critical component of the leachate collection and treatment system necessary to insure an environmentally-safe operation.

The effectiveness of many of the bottom liners is likely to be dependent upon the efficiency of the leachate collection facility used over the liners. For this reason, the effectiveness of various bottom liner/leachate collection systems will be evaluated as combined environmental protection techniques as well as separately. The evaluation will be based at least in part upon the results of the data collected from the monitoring system placed beneath the liners as discussed in Section 6.4.5.

Leachate recirculation and/or treatment is likely to be necessary once the leachate is collected and before discharge to the sanitary sewer system. One obvious general technique to be evaluated involves recirculating the leachate back onto the chemical waste disposal area during the warm summer months when land evaporation could be utilized as a disposal mechanism. Another recirculation alternative to be evaluated is the irrigation of selected grasses and other plants on the surface of the disposal area. The need for storage and auxiliary leachate treatment facilities for use during the winter months when recirculation cannot be carried out will be assessed.

Leachate treatment systems to be evaluated will include off-site disposal at a regional wastewater treatment plant with and without pretreatment and on-site treatment by such unit processes as clarification and surface skimming, chemical precipitation, ion exchange, and evaporation as well as other chemical, physical and biological processes dictated by the anticipated quality of the leachate. Evaluative criteria for selecting the necessary leachate treatment processes will include:

a) Anticipated quality and quantity of leachate generated by the facility as well as the expected seasonal variation in leachate generation.

b) Capital and operating costs of the various techniques as well as the need to demonstrate a range of leachate treatment techniques.

c) Ability of a regional wastewater treatment facility to accept the raw or partially treated leachate from the facility and the anticipated pretreatment standards for the leachate prior to discharge to the regional wastewater treatment facility.

d) Availability of waste preparation facilities which could be utilized as leachate treatment facilities. The selection of leachate treatment facilities will be coordinated with the selection of the waste preparation facilities discussed in Section 6.5 to insure that techniques applicable to both leachate treatment and waste preparation are provided.

e) Long-term applicability of the various leachate treatment techniques will be evaluated. It is recognized that leachate treatment may have to continue after the facility is closed.

Sufficient leachate recirculation/treatment facilities will be provided to insure that no discharge of leachate occurs to the environment which does not meet state standards and that no discharge to the sanitary sewer system occurs which does not meet applicable pretreatment standards of the Metropolitan Waste Control Commission. The temporary storage of leachate prior to recirculation or treatment is recognized as a necessary component of many leachate recirculation/treatment techniques. Leachate will likely not be generated at a constant rate throughout the year and storage of leachate may, therefore, be necessary for efficient design and operation of the recirculation/treatment facilities. Sufficient flexibility in leachate recirculation/treatment systems will be provided to insure that a range of leachate recirculation/treatment technology is demonstrated.

6.4.4 Waste Placement Techniques

Various waste placement techniques will be evaluated for use in the demonstration project. Candidate waste placement techniques for initial evaluation will include conveyor and truck transportation of chemical sludge from storage and preparation areas to land disposal areas; placement of sludge in lifts; placement of liquids, slurries and sludges and solids in shallow trenches and by soil mixing; placement of pumpable wastes by flooding, soil injection, spray irrigation and by truck application; above and below ground encapsulation of extremely hazardous waste and other appropriate waste placement techniques. Criteria used to evaluate the various waste placement techniques for use in the project will include:

a) Ability of placement techniques to dispose of a variety of chemical wastes.

b) Ability of the waste placement techniques to overcome air pollution problems from blowing contaminated particulates and noxious gases.

c) Capital and operating costs of carrying out the various waste placement techniques.

d) Sludge, slurry and liquid waste placement experience and data gained from laboratory and bench scale experiments and from land disposal projects carried out in other areas.

e) Ability of the placement techniques to function under the wide range of climatic conditions experienced in Minnesota.

It is anticipated that a wide variety of waste placement techniques will be used in the demonstration project to provide a wide range of placement costs for different waste characteristics under various seasonal operating conditions. The location of the demonstration project in Minnesota will insure a thorough study of various waste placement techniques under a wide range of climatic conditions.

6.4.5 Other Disposal Area Preparation Techniques

The effectiveness of the various disposal area preparation techniques selected for use in the demonstration facility will be closely monitored using the leachate collection facilities, specially designed monitoring piezometers, suction lysimeters, soil cores, resistivity and pH probes, and other monitoring techniques. As discussed previously, leachate collection facilities will be used to collect the leachate from above the liners and to collect any leachate escaping through the liners. Suction lysimeters will be used to collect leachate samples at various levels above the liners in the disposal area. Resistivity and pH probes will be inserted at various levels in the disposal area to obtain data relative to in-place conditions. Soil cores will be obtained to analyze the exact nature of the waste above the liners. Before placement of the liners, resistivity and pH probes, suction lysimeters and other appropriate monitoring devices will be installed in the sand below the liners, but above the clay waste control barrier to provide data on liner effectiveness. Special attention will be devoted to monitoring the effectiveness of liner splices. Barrier wells (discussed in Section 6.6.2) will be used to monitor the overall effectiveness of the facility design in preventing leachate escape.

Automatic monitoring equipment will be utilized to continuously monitor conductivity and pH and automatic sample collection equipment will be used to collect samples at constant intervals as appropriate. The effectiveness of the various waste preparation techniques in controlling air contamination will be monitored using air quality monitoring stations as discussed in Section 6.6.4. Monitoring the effectiveness of the various site preparation techniques will be carried out by the applicant, by the facility operator and by their subcontractors as discussed in Section 6.8.4. Samples will be analyzed at the laboratory constructed at the demonstration facility. The capabilities of the laboratory are discussed in Section 6.8.3.

One of the demonstration project objectives will be to determine the quality of chemical waste leachate under a wide range of "real-world" operating conditions. The monitoring system will, therefore, not only be utilized to collect data on the effectiveness of the various site preparation techniques, but will also be used to collect data on the quality and quantity of leachate generated by the wastes placed in the various demonstration areas. Resistivity, pH and other probes with automatic recording devices will be installed in the waste disposal areas to aid in interpreting the leachate quality data. As discussed in Section 6.5, the various waste preparation techniques will be selected to provide wastes and, therefore, leachate with a wide range of characteristics.

Surface runoff from the watershed tributary to the actual land disposal areas will be diverted and not carried through the disposal areas. Surface runoff from the actual land disposal areas and from waste storage areas will be collected, stored and, if necessary, treated prior to discharge to the environment or to the regional sewage treatment plant. The advisability of removing snow from the frozen surface of the land disposal areas to reduce surface runoff and reduce leachate generation will be evaluated by the applicant and by the facility operator.

It is anticipated that artificial rainmaking facilities will be provided over approximately one-fourth of the initial land disposal area to simulate extreme climatic conditions which could occur in the project area (as well as other areas of the country), but which may not occur during the demonstration period. The rainmaking facilities will be carefully designed to simulate natural rainfall over the demonstration site.

6.5 WASTE PREPARATION TECHNIQUES

This section of the grant application outlines the various processes and techniques that will be evaluated for use in preparing the various chemical wastes prior to land disposal. The primary purpose of the selected waste preparation techniques will be to provide waste with a wide range in characteristics for demonstration purposes. The ability of the various techniques to prepare waste with a wide range of moisture content, pH and other characteristics important for demonstration purposes will, therefore, be stressed. A second purpose of the waste preparation techniques will be to prepare the chemical wastes generated in Minnesota for safe disposal. A preliminary evaluation indicates, however, that the waste preparation facilities cannot be designed to be a complete centralized chemical, physical and biological chemical waste pretreatment facility within a reasonable project budget. The applicant's general philosophy will be to have generators either pretreat their wastes at the point of generation or create a demand for centralized pretreatment facilities serving specific generator groups. Centralized pretreatment facilities would logically be located adjacent to the demonstration facility, but demonstration funds would not be utilized to plan, design or construct these additional facilities. The nonsewered portion of the chemical waste stream will, for the most part, be delivered to the demonstration land disposal facility either by the generators or by the centralized pretreatment facilities as a concentrated waste principally in sludge form. The demonstration project's waste preparation techniques will then be utilized to prepare various waste with a wide range in characteristics (water content, pH, heavy metal concentrations, etc.) for land disposal demonstration purposes.

The following section (6.5.1) illustrates the basic package of waste preparation techniques that will likely be included in the demonstration project and the criteria which will be used to evaluate the various unit processes within each general technique for eventual incorporation into the project. Section 6.5.2 discusses additional generalized waste preparation techniques that will be evaluated for possible incorporation into the project and the evaluative criteria which will be used. The methods of integrating the various waste preparation techniques into the overall demonstration project are discussed in Section 6.8.1.

6.5.1 Basic Waste Preparation Techniques

The following general waste preparation techniques have been evaluated in a preliminary manner and are being suggested for incorporation into the demonstration project.

- Blending
- Neutralization
- Liquid-Solids Separation
- Fixation
- Encapsulation

These general techniques are being recommended at this preliminary stage due to their flexibility in preparing wastes with a wide range in characteristics. Unit processes to be evaluated within each technique are discussed in the following paragraphs. The criteria to be used to evaluate the various processes are discussed at the end of this section.

a) Blending

Blending techniques will be utilized to mix two or more pumpable or nonpumpable chemical wastes to obtain a waste with physical or chemical characteristics desired for demonstration purposes. For example, it may be desirable to add water to a water soluble paint sludge to produce a paint slurry with a higher water content for demonstration purposes. Unit processes to be evaluated for blending pumpable wastes will include stainless steel, fiberglass, and concrete tanks with rotating impellers, spiral blenders, air agitators and mixing jets. Special facilities necessary to empty pumpable wastes from the tanks will also be evaluated. Blending unit processes for mixing nonpumpable wastes will include rotating drums, double cone blenders and in-line mixing with augers.

b) Neutralization

Neutralization techniques will be utilized to obtain wastes with a range of hydrogen ion concentrations for demonstration purposes. For example, disposal costs and environmental impacts associated with disposing of acidic metal wastes may be significantly different with a pH of 3, than with a pH of 5. Most heavy metals precipitate as hydroxides or hydrous oxides upon neutralization and neutralization techniques will, therefore, be useful to form metal sludges from liquid waste containing metals. Neutralization may be carried out with a special blending of two or more wastes or may require the addition of acid or caustic reagents to a waste. For this reason, it has been included as a separate waste preparation technique and has not been included under "blending techniques". The facilities selected for use as "blending techniques" will be evaluated for use as neutralization facilities. Possibly two or three of the units used for blending can be constructed with sufficient flexibility for use as neutralization facilities.

c) Liquid-Solids Separation

Liquid-solids separation techniques will be utilized principally to remove sludges from supernatent and to reduce the water content of the sludges for disposal related demonstration purposes. The technique will be used to create wastes with the range of moisture contents necessary to demonstrate leaching characteristics, placement problems and the resulting unit disposal costs. Unit processes to be evaluated for incorporation into the demonstration project will include clarification/surface skimming, vacuum filtration, centrifugation and flocculation/sedimentation. Flexibility of equipment will again be stressed. For example, clarification/surface skimming could potentially be carried out in the tanks used for blending and neutralization. The general evaluative criteria to be used in selecting the liquid-solids separation unit processes are included at the end of this section.

d) Fixation

Fixation of chemical wastes using cement, asphalt and various synthetic polymers prior to disposal will also be incorporated into the demonstration project. The purpose will be to evaluate the handling problems, disposal problems, leachate quality and subsequent unit costs associated with this waste preparation technique. Equipment to be evaluated to carry out the various waste fixation processes will include "redi-mix" trucks, stationary rotating drums, a portable asphalt plant, and other "batch" type unit processes.

e) Encapsulation

Experience has shown that some wastes are simply too hazardous and too persistent for land disposal without encapsulation. Polychlorinated biphenols and pesticides containing mercury, lead, cadmium and arsenic for example, will not be placed in the chemical waste land disposal areas without encapsulation. An encapsulation area will be established at the demonstration project and encapsulation facilities will be constructed according to demand. Above ground as well as below ground encapsulation techniques will be evaluated for incorporation into the facility.

Preliminary evaluation indicated that the five general waste preparation techniques outlined in the preceding paragraphs will be necessary at the facility to insure waste with a wide range of characteristics for demonstration purposes. The various unit processes within each of these five techniques will be evaluated for incorporation into the project by the applicant, the site operator and their consultants as outlined in 6.7.2 using the following evaluative criteria:

i) Unit processes applicable to the batch preparation of wastes will be given priority. As outlined in Section 6.8.1, chemical wastes will be initially separated and stored for predisposal preparation. When a sufficient quantity has accumulated, the waste will be prepared using batch processes. Sufficient wastes are obviously not available to make continuous operation of the various preparation techniques possible.

ii) Flexibility in equipment will be stressed. Blending and neutralization for example, could be carried out in the same properly designed mixing tanks. One or two of the tanks used for blending and neutralization could also be designed for clarification and surface skimming.

iii) Capital and operating costs will, of course, be considered when alternative unit processes are evaluated.

iv) The applicability of the various processes to prepare the types of chemical wastes generated in the service area will be considered. The ability of the various facilities to create less reactive or less hazardous wastes for land disposal will be stressed.

v) The use of the waste preparation processes to treat chemical waste leachate will also be considered. As discussed in Section 6.4.3, the flexibility of unit processes to not only prepare waste for disposal, but to also pretreat leachate prior to discharge to a municipal wastewater treatment plant will be stressed.

vi) The size of the facilities necessary to pretreat the volume of waste generated in the service areas will also be considered, but will be given a lower priority than the facilities needed to provide the necessary range of wastes for demonstration purposes. It is anticipated that the budget available for waste preparation will be a factor limiting the sophistication of selected unit processes.

6.5.2 Additional Waste Preparation Techniques to be Evaluated

The general waste preparation techniques outlined in Section 6.5.1 represent a basic package necessary to prepare waste with a wide range of characteristics. In addition, the following general waste preparation techniques will be evaluated for incorporation into the demonstration project:

- Chemical Precipitation
- Oxidation/Reduction
- Concentration
- Filtration

The evaluation will be carried out using the evaluative criteria included at the end of this section. These evaluative criteria were the criteria originally used to select the basic waste preparation techniques discussed in Section 6.5.1.

a) Chemical Precipitation

Chemical precipitation will be evaluated as a waste preparation technique to be incorporated into the demonstration project. The primary use for this technique will be to generate concentrated metal sludges from liquid wastes containing metals. Chemical precipitation with sulfide will often result in supernatent heavy metal concentrations lower than would occur with neutralization. Depending on the discharge requirements to the municipal wastewater treatment plant, this technique may be necessary for leachate and supernatent treatment.

b) Oxidation/Reduction

It is anticipated that large quantities of cyanide and chromium bearing wastes will be generated in the service area. For this reason, oxidation of cyanides and other reductants and reduction of chromium and other oxidants will be evaluated for incorporation into the facility. Chlorine oxidation and sulfur reduction are two candidate unit processes.

c) Concentration Techniques

Various unit processes will be evaluated for concentrating portions of the incoming waste stream beyond the liquid-solids separation and chemical precipitation techniques already discussed. Such candidate processes as deionization, distillation and refining will be evaluated. Such relatively sophisticated concentration techniques are more likely applicable to resource recovery facilities and may not be within the scope of the demonstration project.

d) Filtration Techniques

Various unit filtration processes will be evaluated other than the liquid-solids separation facilities already discussed. The filtration processes to be evaluated will include vibrating screens, slow and rapid sand filters, tri-media filters and membrane filters. The purpose of these filtration techniques will be to increase the flexibility of the liquid-solids separation facilities included in the basic package of waste preparation techniques.

The four additional waste preparation techniques outlined above will be evaluated for inclusion with the basic waste preparation techniques by the applicant, operator and their consultants as outlined in 6.7.2 using the following evaluative criteria:

i) Will the additional technique significantly increase the ability of the basic waste preparation techniques summarized in 6.5.1 to create wastes with a wide range of characteristics (water content, solubility, pH, major ion concentration, workability, etc)?

ii) Does the additional waste preparation technique represent a cost effective and environmentally safe method of handling the waste generated in the area serving the demonstration project?

iii) Can the additional waste preparation technique be constructed and operated within a reasonable budget for the demonstration project?

If the evaluative criteria outlined above indicate that one or more or the additional waste preparation techniques should be included in the project, the evaluative criteria outlined in Section 6.5.1 will be used to evaluate the select and appropriate unit process within the selected additional waste preparation technique.

6.6 ENVIRONMENTAL PROTECTION STRATEGIES

The purpose of the various waste control and leachate collection techniques outlined in Section 6.4 is to contain and collect leachate generated by the chemical land disposal facility. As discussed in Section 6.3.1 and in Section 6.4.1, a second waste control barrier will be provided by lining the facility with compacted clay overlain by clean sand and a second leachate collection system. The purpose of the second waste control barrier is to facilitate the collection of any leachate which percolates through the primary waste control barriers. The second waste control barrier enables the effectiveness of the various liners and membranes used in the primary waste control system to be evaluated.

Due to the experimental nature of the demonstration project, however, the applicant recognizes that certain site preparation and waste placement demonstrations may not be completely successful. Leachate may be released by one or more of the unsuccessful demonstrations or by an accidental spill at the project site. The various artificial membranes which may be used as primary barriers over a portion of the land disposal area have a finite life and leakage may eventually occur. A contingency environmental protection and waste containment strategy is, therefore, necessary to provide a second line of environmental protection to capture any leachate, or surface runoff which may be generated by the project. This contingency environmental protection strategy may not be needed during the life of the facility and indeed may never be needed. However, the second level system will initially serve as an environmental surveillance network to detect leachate in the ground water, contamination in surface waters or contamination in the air leaving the site and will be available if needed to recapture any waste leaving the facility.

Another important component of the overall environmental protection strategy is the development of a facility closure plan for use when disposal of chemical waste at the facility is terminated. The objective of the facility closure plan will be to prohibit the additional generation of leachate, prohibit the contact between surface runoff and chemical waste and prohibit the contamination of the air by waste material.

The third important component of the environmental protection strategy is a carefully designed and carried out environmental surveillance program during facility operation and after facility closure.

This section of the grant application discusses the contingency waste containment strategies that will be utilized at the selected site, discusses the facility closure plan, and discusses the environmental surveillance network that will be utilized out at the selected site. The discussion has been divided into the following three subsections:

- Contingency Waste Containment Strategies
- Facility Closure Plan
- Environmental Surveillance Strategies

6.6.1 Contingency Waste Containment Strategies

a) Surface Waste

Surface water from areas outside the site boundaries will be diverted around the site using a designed system of ditches and culverts. Storage of surface water from areas outside the site boundaries will be utilized if economically feasible.

All surface water runoff from the actual disposal areas and from the areas used to load, store and prepare chemical wastes will be collected in a "contaminated water" storage area. This storage area will be lined with a suitable liner material (probably one or more of the materials discussed in Section 6.4.1) to prevent seepage to the ground water system. The storage area will be designed by the facility operator and their consultants using design criteria supplied by the applicant. Final plans and specifications for the storage area as well as for the entire facility will be approved by the applicant as outlined in 6.7.2. Surface runoff from other project areas will be diverted around the storage and disposal areas and collected in a "clean water" storage area. This storage area will also be lined with suitable material to prevent seepage to the ground water system.

The quality of the water in the "contaminated water" storage area will likely not meet appropriate surface water discharge standards. The effluent from this storage area will, therefore, be treated prior to discharge to the environment or discharged with pretreatment (as necessary) to the sanitary sewer system. The water in the "clean water" storage area may meet applicable discharge standards. If standards are not met, the "clean water" will be pretreated (as necessary) and discharged to the sanitary sewer. The storage of water in these two sealed storage areas will insure that all surface runoff discharged from the site will be in compliance with applicable water quality regulations.

b) Ground Water

As discussed previously, the various leachate containment and collection techniques outlined in Section 6.4 will provide primary barriers to leachate generated by the chemical waste land disposal facility. These leachate containment and collection techniques will be constructed well above the ground water table. Due to the experimental nature of the demonstration project, however, it is recognized that certain leachate collection and containment demonstrations may not be completely successful. Leachate may be generated and released by one or more of the unsuccessful demonstrations or by accidental spills at the site. The clay waste control barrier has been included to contain the leachate and enable the collection of all leachate escaping the primary barriers. An additional level of ground water protection will be provided through the use of barrier wells. These wells will be constructed into the glacial outwash ground water system down gradient of the project site.

The barrier wells will be utilized initially as monitoring wells to monitor the performance of the clay seal and secondary leachate collection system. Ground water collected at the barrier wells will be monitored periodically with a gas chromatograph and mass spectrometer to determine whether leachate is being collected. If the ground water samples comply with Federal and state water quality standards and show no evidence of leachate contamination, the ground water will be allowed to continue to the river. If, however, ground water samples indicate the presence of leachate and do not meet applicable water quality standards, the ground water will be collected using the barrier wells. The collected ground water will be pretreated prior to discharge to either the regional wastewater treatment plant or to the surface water system.

In the event that barrier wells are needed to collect escaping leachate, two sets of barrier wells may be utilized. One set of wells will be installed up gradient of the site. These wells will be used to collect clean ground water entering the site area. Water collected by these wells will be uncontaminated by leachate and, therefore, will be discharged directly to the environment. The barrier wells located downstream of the site will then be used to collect ground water from beneath the site. This will reduce the amount of water that must be pretreated prior to discharge while insuring that all leachate escaping from the waste containment systems will be collected.

In summary, a back-up level of ground water protection will be provided by barrier wells constructed down gradient of the site. The barrier wells will initially be used as sample collection facilities to enable the monitoring of ground water flowing beneath the site. If the monitoring indicates the presence of leachate, the wells will be used to collect all leachate leaving the demonstration facility.

c) Air

As discussed in Section 6.4.4, air quality contamination from the site will be primarily controlled through the various waste placement techniques. Air quality will be continuously monitored through the use of a number of air quality monitoring stations surrounding the site as discussed in Section 6.6.3. As a contingency air quality protection strategy, wind movement across the site will be minimized with screening around the site. Additional ground surface preparation techniques will also be utilized if the air quality monitoring data indicates that air-borne contaminants are leaving the site.

The use of the contingency air quality protection strategies will be evaluated by the applicant, by the facility operator and by their consultants using data generated by the monitoring facilities. The availability of natural screening to minimize air movement across the site will also be evaluated and incorporated into the design of the project.

6.6.2 Facility Closure Plan

As part of the facility design, a facility closure plan will be developed. This closure plan may be implemented in stages as the various portions of the land disposal areas are closed. The facility closure plan will include the repair of any disposal areas which show leachate generation, surface runoff contamination, or air quality contamination. Also included will be the removal of the various buildings, storage facilities and a general site clean-up. The capping of the waste disposal areas with a suitable material to eliminate future production of leachate, surface runoff and air contamination will also be evaluated. The objective of the facility closure plan will be to eliminate future problems from the facility after closure. If leachate, contaminated surface runoff or air quality contamination are not being generated at the time of closure and if the facility is closed and the disposal areas properly capped, it is reasonable to expected that, with proper maintenance, the facility should not present a future problem.

The cost of implementing the closure plan will be included in the user fees as discussed in Section 6.9 of the grant application. As discussed in Section 6.9, one of the objectives of the cost accounting strategy will be to create a fund to implement the closure plan. The design of the closure plan will be continually updated as the project is implemented to take into account any leachate generation, surface runoff contamination or air quality contamination problems which may be occurring and were not foreseen in the project design. In a similar fashion, the cost of implementing the closure plan will also be periodically re-evaluated and if closure costs change, the revised cost will be reflected by revisions to the user fee.

6.6.3 Environmental Surveillance

The purpose of this section of the grant application is to outline the various methods and techniques that will be used to monitor the air, water, vegetation and soils in the project area during facility operation and after facility closure.

a) Surface Water Monitoring

Surface water will be monitored in the "clean water" and "contaminated water" storage areas as well as in the storage area inflow and outflow conduits. The inflow conduits will carry surface runoff from the chemical waste storage areas and disposal areas to the "contaminated water" storage area and from the rest of the facility to the "clean water" storage area. Samples will be periodically collected from the storage area inflow and outflow conduits as well as from the storage areas themselves. These samples will be analyzed by mass spectrometry and gas chromatography to detect the presence of any undesirable elements and compounds. Continuous recording pH and conductivity monitors will be installed in the storage area inflow conduits to act as primary indicators of contamination. Surveillance activities used to evaluate the impact of the facility on the surrounding environment will be conducted by the applicant or by his subcontractors. This is believed to be necessary to insure public acceptance of the resulting data and conclusions.

b) **Ground Water Monitoring**

As discussed in Section 6.4.5, leachate collected by the primary and secondary leachate collection systems will be monitored. This monitoring, however, is for the purpose of evaluating the effectiveness of the various leachate containment and collection systems and for determining the quality of leachate generated by the chemical waste. Leachate will be collected by the primary and secondary collection systems before reaching the ground water table.

In order to insure the effectiveness of the primary and secondary waste control barriers, the ground water beneath the site will also be monitored. Ground water monitoring will be conducted through the use of barrier wells constructed down-gradient of the land disposal area. The use of the barrier wells for ground water monitoring purposes and for leachate collection purposes in the event of leachate escape from the primary and secondary waste control barriers, is discussed in Section 6.6.1. Water quality samples collected from the barrier wells will be periodically analyzed using mass spectrometry and gas chromatography to detect the presence and concentration of any leachate. In addition, continuous recording pH and conductivity probes will be inserted in the barrier wells and used to measure changes in these indicator parameters. If changes in the indicator parameters are detected or if mass spectrometry and gas chromatography analysis indicates the presence of potentially harmful characteristics, additional analyses will be carried out.

Soil borings taken at areas adjacent to both potential land disposal sites do not indicate the presence of perched water table conditions. If additional soil borings taken during and after site selection indicate that perched water table conditions exist, the quality of the perched ground water as well as the quality of the true ground water will be monitored.

The barrier well system discussed in the preceeding paragraphs will be supplemented with smaller diameter piezometers. The piezometers will be placed up-gradient and down-gradient of the site and will be used to collect ground water samples. Cased piezometers will also be installed into the underlying bedrock aquifers to insure that leachate from the facility is not degrading the quality of the water in the lower bedrock aquifers. Background ground water quality will be collected from the various monitoring systems before waste is placed in the site.

Ground water levels will be recorded immediately before all water samples are collected. These measurements will enable the detection of any changes in ground water levels that may affect the ground water gradients and flow directions.

c) Soil and Vegetation Monitoring

Recent studies carried out by the Illinois Water Survey indicate that observation well monitoring systems may not be the most effective means to trace chemical pollutant ground water flow patterns or to determine ground water chemical concentrations.(8) The studies show that chemical analyses of core samples from the underlying soil profile may permit a more positive definition of the chemical constituents within the profile. In addition, the studies indicate that chemical analyses of soil core samples usually is a faster, easier and more economical method of soil and ground water pollution evaluation than the analyses of ground water samples collected from observation wells.

Due to the need to maintain the integrity of the primary and secondary waste control barriers, it will be impossible to collect soil core data into the ground water table below the actual chemical waste disposal areas. Soil core data, however, will be collected down-gradient of the facility near the barrier wells and monitoring piezometers. The soil core samples over the entire saturated vertical column of soil will be analyzed for various chemical parameters. The frequency of core sample collection is estimated to be semi-annually, one after the spring ground water recharge season and the other approximately six months later after the growing season. Initial soil core test data will be collected as background data on soil characteristics.

Plant uptake of toxicants will be evaluated by conducting chemical analyses on a select number of vegetation samples. Plants growing on the land disposal area will, of course, be obvious candidates for analysis. Plant residues which accumulate at the end of each growing season will also be evaluated.

d) Air Quality Monitoring

Air quality monitoring will also be carried out around the site by the applicant or by his subcontractors. Of major interest will be the amount and chemical analysis of particulate matter. Appropriate sample collection devices will be installed at locations surrounding the site as well as the site. Temperature, precipitation, wind velocity and wind direction will also be measured. Background air quality data will be collected before waste is placed in the site.

e) Perpetual Monitoring

Surface water, ground water and air quality monitoring stations will be selected for perpetual monitoring of the facility. As outlined in the cost accounting strategies, a perpetual monitoring fund will be built-up through user fees collected over the life of the facility. After facility closure, interest from the perpetual monitoring fund will be used to perpetually monitor the surface water, ground water and air resources potentially impacted by the facility. The principal in the perpetual monitoring fund will then be available for emergency use at the facility if the perpetual monitoring indicates that environmental degradation is occurring or if maintenance is necessary at the facility.

6.7 INSTITUTIONAL ARRANGEMENTS

This section of the demonstration grant application outlines the institutional arrangements that will be utilized to implement the demonstration grant. This section includes a summary of the state hazardous waste administrative framework, two alternative facility owner/operator arrangements, grant administrative and regulatory responsibilities and the strategy the applicant will use to select an operator for the facility. The various institutional arrangements are discussed in the following subsections.

- State Hazardous Waste Administrative Framework
- Grant Administrative Responsibilities
- Facility Ownership/Operator Arrangements
- Facility Operator Selection Procedures
- Facility Regulatory Responsibilities

6.7.1 State Hazardous Waste Administrative Framework

The overall state hazardous waste management administrative framework being implemented by the applicant and by the counties is discussed in detail in Section 6.2.2 of this grant application. In summary, counties will prepare county-wide plans for hazardous waste management and will adopt ordinances relative to hazardous waste licensing, classification, labeling, transportation, treatment and disposal. Counties will also review and issue hazardous waste generator licenses to generators of hazardous waste. Counties will be the prime agency in the enforcement of the generator license relative to classification, safe handling, labeling, transportation and treatment/disposal of waste. Counties will also review and issue licenses for hazardous waste treatment/disposal facilities located in the county.

Under the state hazardous waste administrative framework, the applicant will review and approve county hazardous waste plans, ordinances and licensing procedures, develop a statewide hazardous waste management plan and statewide hazardous waste regulations, review waste generator licences before issuance by the county, issue hazardous waste treatment/

disposal facility permits and review and periodically check the environmental surveillance data supplied by the hazardous waste treatment/disposal facilities. The Minnesota Public Service Commission will license vehicles transporting hazardous waste and prescribe necessary safety regulations.

The overall hazardous waste administrative framework represents a combination of efforts between the counties, the applicant and the Public Service Commission. Other agencies such as the regional planning agency, municipalities and regional sewer agencies have supporting roles in the hazardous waste management framework. In establishing the institutional framework for the demonstration project, the applicant has strived to establish institutional arrangements consistent with the existing hazardous waste management administrative framework in Minnesota.

6.7.2 Grant Administrative Responsibilities

The applicant will be directly responsible to the Environmental Protection Agency for administering the grant, as well as for the timely and accurate implementation of the project in accordance with all Federal, state, and local requirements. The applicant will assign the demonstration funds necessary for facility design, construction and operation to an intermediate governmental agency with the legal authority to own the site and will operate the facility or contract for facility operation. Two alternative intermediate governmental agency/facility operator arrangements have been identified and are discussed in detail in 6.7.3. The governmental agency owning the site will then either operate the facility or contract with the selected operator. The applicant will retain control of the demonstration project by an agreement with the selected intermediate governmental agency. An intermediate governmental agency must be utilized since the applicant does not have the authority to own the site or operate the facility as outlined in the legal memorandum included in Appendix I.

The facility operator will be responsible to the applicant for the design, construction and operation of the chemical waste land disposal demonstration facility in accordance with all demonstration and project-related requirements as established by the applicant. The applicant will review and approve all facets of the design, construction and operation of the project to insure that all procedures are carried out in accordance with demonstration and project-related requirements. The intermediate governmental agency will serve only as a vehicle to own and either operate or contract for the operation of the facility.

The land upon which the facility will be constructed will be owned by the intermediate governmental agency. The intermediate governmental agency will hold title to the land and will be responsible for the perpetual maintenance and monitoring of the facility. Minnesota's share of the matching grant money will be obtained by the intermediate governmental agency through the sale of revenue bonds.

The design and construction of the environmental surveillance system will be coordinated with the site operator, but will be carried out by the applicant. The applicant will collect background environmental monitoring data after the environmental surveillance system is constructed.

During the five-year demonstration grant period, the applicant, facility operator, and intermediate governmental agency will have the following responsiblities to carry out the demonstration project.

a) Applicant

The applicant will receive all federal money and will be responsible to the Environmental Protection Agency for carrying out the various demonstration and project-related activities as detailed in the grant agreement between the applicant and the Environmental Protection Agency. The applicant will administer the grant through the following responsibilities.

i) Select the Site--As discussed in Section 6.3, two potential sites for the demonstration facility have been selected. After grant award, the feasibility of contructing the demonstration facility at these two sites will be investigated through the collection of additional background data principally in terms of citizen and regulatory agency acceptance. It is anticipated that the necessary permits and approvals can be obtained for one of the two sites, however, additional sites may have to be evaluated if the two sites prove to be unacceptable. The applicant will select the final site for the facility.

ii) Select the Operator--The applicant will select the facility operator using the procedures discussed in Section 6.7.4.

iii) Arrange Minnesota's Funding--The applicant will coordinate and be responsible for supplying the nonfederal share of the demonstration grant. Nonfederal grant money will be placed into an account with the Federal demonstration money. All project costs will be drawn from this account.

iv) Approve Annual Operating Budgets--The applicant will approve annual operating budgets prepared by the facility operator for each year of the demonstration project. The annual operating budget will include all money for facility operation, design, construction, equipment and related needs spent by the facility operator.

v) Select Demonstration Processes and Techniques--The applicant will have final approval on all demonstration processes and techniques to be incorporated into the demonstration project. The applicant will base approval on the grant agreement, on the evaluative criteria outlined in the demonstration grant application, on the recommendations of the applicant's staff and on the recommendations of the operator. The Environmental Protection Agency will be included in the selection of the various processes and techniques.

vi) Approval of Subcontracts--The applicant will retain approval authority over all subcontractors retained by the operator.

vii) Public Education Program--The applicant will be responsible for carrying out the various citizen acceptance and public education programs outlined in Section 6.10. The applicant will coordinate the various citizen acceptance and public education programs with the operator and insure that the facility is available for the various programs.

viii) Approve Construction Plans and Specifications--The applicant will review and approve all construction plans and specifications prepared by the facility operator or the facility operator's subcontractors. Approval will be based on the demonstration project objectives and on the processes and techniques selected for incorporation into the project.

ix) Approve Operating Manuals--As discussed in Section 6.8, operating manuals will be prepared by the facility operator for all key waste flow management points within the facility. These operating manuals will detail the procedures and techniques to be used in managing waste flow through the facility.

x) Approve Job Descriptions--The applicant will approve all job descriptions for personnel to operate the facility prepared by the facility operator.

xi) Approve Cost Accounting Strategy--The applicant will have review and approval authority over the cost accounting strategy recommended by the facility operator for incorporation into the demonstration project. Approval will be based on the demonstration project objectives and on the evaluative criteria outlined in Section 6.9 of the demonstration project.

xii) Inspect Facility Construction--The applicant will inspect the construction of the facility. Since the facility operator will also be responsible for inspecting facility construction, the applicant's inspection will likely take the form of reviewing the facility operator's project inspection efforts.

xiii) Monitor Facility Start-up and Routine Operation--The applicant will monitor and inspect the start-up and routine operation of the facility to insure that the various demonstration project objectives, operating agreements and operating manuals are being followed.

xiv) Coordinate Waste Flow to the Facility--As discussed in Section 618, the generator licensing program will be a useful tool to plan and, if necessary, regulate the flow of waste to the facility. The applicant will be responsible for coordinating this planning and regulatory effort and will inform the operator of expected facility waste volumes on a quarterly basis. The applicant will also approve all waste acceptance criteria. If necessary, the applicant will also coordinate the regulation of waste to the facility by imposing necessary restrictions on the waste generator licensing program.

xv) Design and Construct Environmental Surveillance System--The applicant will be responsible for the environmental surveillance of the site including the design and construction of the environmental surveillance system.

xvi) Collect Environmental Surveillance Data--The applicant or the applicant's subcontractors will collect all environmental surveillance data during the demonstration period. This will include the monitoring of surface water, ground water, air quality, soil and vegetation.

xvii) Project Reports and Annual Audit--The applicant will be responsible for completing all interim and other reports connected with the demonstration grant. The applicant will also be responsible for carrying out an annual audit on the demonstration project.

b) **Facility Operator**

During the demonstration period, the facility operator will have the following project responsibilities:

i) Prepare an annual operating budget and submit the budget to the applicant for review and approval.

ii) Select subcontractors to assist in the planning, design, construction and operation of the facility.

iii) Recommend processes and techniques to be included in the demonstration project.

iv) Prepare plans and specifications for the construction of the demonstration project.

v) Prepare operating manuals for key waste flow management points within the demonstration facility.

vi) Obtain the necessary operating permits and approvals from the various local, county, regional and state agencies.

vii) Order the necessary equipment to operate the facility within the annual operating budget.

viii) Recommend a cost accounting strategy to be implemented at the facility.

ix) Advertise and let contracts for the construction of the facility consistent with the plans and specifications as approved by the applicant and within the annual operating budgets.

x) Inspect the construction of the facility to insure that the approved plans and specifications are followed.

xi) Prepare job descriptions and hire personnel to operate the facility.

xii) Operate an environmentally-safe facility consistent with the operating manuals and demonstration project objectives.

xiii) Carry out the necessary demonstrations at the project including the collection of data sufficient to evaluate the demonstrations.

xiv) Furnish the demonstration and operational data to the applicant in the form of interim data reports and in the form of an annual operating report.

xv) Make the facility available to the applicant's public education efforts.

xvi) Conduct an annual operational audit of the facility.

c) Intermediate Governmental Agency

As discussed earlier in this subsection, an intermediate governmental agency will be utilized to own the site and to either operate the demonstration facility or contract for the operation of the facility. Two alternative intermediate governmental agency/operator frameworks have been identified and are discussed in 6.7.3. Under the proposed grant administrative responsibilities framework, the intermediate governmental agency will:

i) Purchase the land with demonstration project money.

ii) Own the land upon which the demonstration facility is constructed and be responsible for perpetual monitoring and maintenance.

iii) Transfer money from the applicant to the operator since the applicant does not have the authority to operate or to contract for the operation for the demonstration facility as outlined in the legal memorandum contained in Appendix I.

iv) Furnish the nonfederal share of the demonstration grant.

6.7.3 Facility Ownership/Operator Arrangements

The applicant has identified two alternatives for ownership and operation of the demonstration facility. Both of the alternatives will meet the demonstration project objectives. One alternative involves ownership and operation by a public agency and the second alternative involves public ownership with private sector operation. Under both alternatives, the applicant will be directly responsible to the Environmental Protection Agency for administering the demonstration grant as well as for the timely and accurate implementation of the project in accordance with all Federal requirements. As discussed previously, the applicant does not have the authority to operate the facility or own the land utilized for the facility. Therefore, an intermediate governmental agency is needed to own the site and either operate the facility or contract for operation of the facility. Under both ownership/operator alternatives, the applicant will review and approve the design, construction and operation of the facility to insure that all procedures are carried out in accordance with demonstration and project-related requirements.

a) Metropolitan Waste Control Commission Ownership and Operation Alternative

Under this alternative, the applicant will assign the demonstration funds necessary for facility design, construction and operation to the Metropolitan Waste Control Commission (MWCC). The MWCC is the regional agency responsible for the design and operation of the sanitary sewer system in the seven county Minneapolis/St. Paul metropolitan area. The MWCC was formerly referred to as the Metropolitan Sewer Board. The MWCC may then subcontract the design and construction of the facility although all subcontractors retained by the MWCC will be approved by the applicant. The Metropolitan Waste Control Commission will own the land upon which the facility is constructed and will be responsible for the perpetual monitoring and care of the site. The MWCC will be responsible to the applicant for the design, construction and operation of the chemical waste land disposal demonstration facility in accordance with all demonstration and project-related requirements as established by the applicant. Guidelines within which the MWCC will carry out these responsibilities will be stipulated in the contract between the applicant and the MWCC. The applicant will review and approve the design, constuction and operation of the project to insure that all procedures are carried out in accordance with demonstration and project-related requirements. Minnesota's share of the matching grant money will be furnished by the MWCC under this alternative.

The MWCC has passed a resolution authorizing an agreement with the applicant as a prime contractor to manage a chemical waste land disposal site in order to carry out the applicant's responsibilities under the demonstration grant. A copy of the resolution is included in Appendix E.

b) County Ownership/Private Operation

Under this alternative, the applicant will assign the demonstration funds necessary for facility design, construction and operation to a county in the Minneapolis/St. Paul metropolitan area. The county will contract with a facility operator selected from the private sector using the nationwide search procedures outlined in 6.7.4. The facility operator will be responsible to the applicant for the design, construction and operation of the chemical waste land disposal facility in accordance with all demonstration and project-related requirements as established by the Environmental Protection Agency and the applicant. Guidelines within which the facility operator will carry out these responsibilities will be stipulated in a contract between the applicant and the county and between the county and the facility operator. The applicant will review and approve the design, construction and operation of the project to insure that all procedures are carried out in accordance with the demonstration and project-related requirements.

The county will serve as a vehicle to contract for the operation of the facility since, as indicated previously, the applicant does not have the authority to contract directly for the operation

The land upon which the facility will be constructed will be owned by the county. The county will, therefore, be responsible for the perpetual maintenance and monitoring of the facility using money generated from the facility user fees. Minnesota's share of the matching grant money will be obtained by the county through the sale of revenue bonds likely underwritten by all the counties in the metropolitan area.

The applicant has worked closely with the metropolitan counties and county planning agency in developing the institutional arrangements for this demonstration project. The counties are interested in being the intermediate governmental agency to own the site and contract for facility operation, however, a county board resolution could not be obtained prior to grant application. A copy of the resolution will be forwarded to the Environmental Protection Agency as soon as it is received from the county.

c) Discussion of Alternatives

The following advantages and disadvantages of the two alternative facility ownership/operator frameworks have been identified by the applicant:

The Metropolitan Waste Control Commission reportedly has sufficient money available to furnish Minnesota's share of the demonstration grant. The counties, on the other hand, will issue revenue bonds to generate Minnesota's share of the demonstration grant. Due to project time constraints, money availability would seem to give a slight advantage to the Metropolitan Waste Control Commission alternative although a reasonable amount of time has been provided in the implementation schedule to issue revenue bonds.

The Metropolitan Waste Control Commission indicates they have the legal authority under existing legislation to own and operate the demonstration facility. Likewise, the counties have the legal authority to own and contract for the operation of the demonstration facility under the existing solid and hazardous waste legislation. Both agencies also have the authority to collect fees from facility users.

At the present time, counties have solid and hazardous waste operating responsibilities throughout the state. Debate is presently occurring as to whether solid and hazardous waste operating responsibilities should be regionalized in the metropolitan area. County ownership and contracted operation of the facility, therefore, is consistent with existing solid and hazardous waste planning legislation. This would seem to present an advantage to the county alternative.

Regulatory relationships would seem to be stronger and better defined under the Metropolitan Waste Control Commission alternative. The county in which the facility is located will have responsibilities in the regulation of the chemical waste land disposal facility. Mixing county ownership and operation with county regulatory responsibilities may weaken the regulatory responsibilities of the county alternative.

The need for the site is the result, at least in part, of pretreatment regulations being promulgated by the Metropolitan Waste Control Commission. These pretreatment regulations will control the discharge of chemical waste to the sanitary sewer system and necessary pretreatment will lead to the generation of large quantities of chemical sludge. It could be argued that the Metropolitan Waste Control Commission should carry the responsibility of providing an alternate means of disposal for this sludge.

The Metropolitan Waste Control Commission and the counties have powers of eminent domain and both can obtain the necessary technical expertise to design and construct the facility.

The counties are willing to select the most qualified operator from the private sector. Experience available in the private sector will be useful in operating the demonstration facility, therefore, the commitment to use private sector operation would seem to represent an advantage to the county ownership/private operator alternative.

In summary, the Metropolitan Waste Control Commission owernship/ operator alternative has the following advantages:

i) Stronger and more clearly defined regulatory relationships

ii) Has money available to provide Minnesota's share of the grant

iii) Involved in the generation of chemical waste sludges

The county ownership/private sector operator alternative has the following advantages:

i) Consistent with existing solid and hazardous waste operating legislation

ii) Willing to utilize expertise and efficiency of the private sector

d) Selection of Ownership/Operator Framework

Due to time constraints placed on the preparation of the grant application by the Environmental Protection Agency, the applicant has not been able to reach a final decision on the ownership/ operator alternative to be incorporated into the demonstration project. The Minnesota Legislature will also be considering a transfer of the solid and hazardous waste operating responsibilities from the counties to a regional agency in the Minneapolis/St. Paul metropolitan area during the current legislative session which began in January. For these reasons, the applicant proposes to continue to evaluate the two ownership/operator alternatives after grant application submittal and prior to grant award. If required by the Environmental Protection Agency, the applicant will select the facility ownership/operator framework during the grant application review period prior to grant award. The applicant's decision will be based on the status of legislation to reorganize the solid and hazardous waste responsibilities and on the interest expressed by the principals in the two ownership/operator frameworks.

The applicant wishes to emphasize that both of the two ownership/operator alternatives will "get the job done". Both are consistent with existing legislation and no new legislation will be needed to implement either alternative. Both alternatives have stable funding sources and the ability to acquire land through eminent domain, if necessary. The intermediate governmental agencies involved in both alternatives have many other responsibilities and can be expected to be in existence for perpetuity to carry out the necessary perpetual monitoring and maintenance activities at the facility after closure. Both intermediate governmental agencies have expressed an interest in owning and operating the demonstration facility.

6.7.4 Facility Operator Selection Procedures

This section of the demonstration grant application discusses the procedures to be used by the applicant to select a facility operator if the county ownership/operator framework is selected for incorporation into the demonstration project. If the MWCC alternative is selected, the MWCC will also likely operate the facility and the following selection procedures will not be needed.

The company or agency selected to eventually operate the land disposal facility is, of course, a component critical to a successful demonstration project. The operator must have personnel well-qualified in terms of experience and education with the ability to work with the general public and with the regulatory agencies monitoring the planning, design and operation of the facility.

Due to the severe time constraints placed on the submittal of the grant application by the Environmental Protection Agency, the applicant was unable to select an ownership/operating framework. If the county ownership/private sector operator alternative is selected, a nationwide search and evaluation of the various industries of the private sector interested in operating the demonstration facility will be conducted by the applicant. Under state law, the applicant must conduct such a nationwide search to find the most qualified operator. For this reason, a private sector operator to go with the county ownership/private sector operator alternative has not been selected.

The operator selection procedures, however, have been established. In order to locate qualified potential operators for the facility from the private sector, the applicant contacted the National Solid Waste Management Association. The National Solid Waste Management Association submitted a list of nine industries the Association believes would be interested and qualified to operate the disposal facility.

A Solicitation of Interest has been prepared by the applicant and will be forwarded to the nine chemical waste management industries if the county alternative is selected. The Solicitation of Interest outlines the details of the demonstration project and requests interested industries to submit the qualifications and experience that would enable them to carry out the responsibilities of the facility operator.

After reviewing the responses from the interested operators, the applicant will interview the three or four most qualified operators. Based on these interviews and based on the qualifications submitted in response to the Solicitation of Interest, the applicant will select a facility operator. Upon selection, the applicant will enter into a contract with the county and the county will enter into a contract with the facility operator to design, construct, and operate the facility. All contracts will be submitted to the U.S. Environmental Protection Agency for review and approval.

The following operator selection criteria will be utilized by the applicant in reviewing the qualifications and experience records of the potential facility operators:

a) Ideally, the candidate operator should have a record of experience in the land disposal of waste (i.e., waste placement, compaction, covering, equipment maintenance, monitoring, collection of user fees, etc.), as well as experience in hazardous waste management (i.e., proper disposal methods with practical yet environmentally-safe alternatives, transportation, storage, handling, treatment, and safety precautions).

   In the alternative, the candidate must either:

   i) be able to show an experience record in the land disposal of waste and be able to exhibit an understanding of hazardous waste management; or

   ii) be able to show an experience record in hazardous waste management and be able to exhibit an understanding of the land disposal of wastes.

b) The candidate should have in-house experience in designing, constructing and operating a project of the size envisioned in the grant application (i.e., 100 acres, 500,000 dollars per year estimated gross income, coordinating many diverse disciplines in design and operational activities) and must be willing to operate the project as the parent company and not as a separate single project entity.

c) The candidate must demonstrate a record of good working relationships with various regulatory agencies either in Minnesota or in other states. A list of all regulatory agency permits and licenses held by the candidate must be furnished.

d) The candidate must furnish a detailed experience record of the person responsible for direct management of the chemical waste land disposal facility. The person so indicated must be willing to spend 100 percent of his or her time on the project or on project-related activities and not less than 90 percent of his or her time at the project site. The project manager must have a broad background in chemical materials handling and in the management of projects involving a number of diverse disciplines.

e) The candidate must exhibit an experience record in working with local citizens and with local, regional and state decision makers (in Minnesota or in other states) in gaining citizen acceptance for the potentially unpopular activities. A list of projects demonstrating this experience should be furnished.

f) The candidate should be sound financially and be able to obtain the necessary bonding and insurance to construct and operate the facility.

6.7.5 Facility Regulatory Responsibilities

The operation of the facility will be regulated by the applicant as well as by the county and municipality in which the facility is located. All permits and approvals will be obtained by the facility operator with the cooperation and assistance of the applicant. The following responsibilities will be utilized to regulate the facility:

a) Applicant

The demonstration facility must obtain a number of permits from the applicant. These permits will include a solid waste permit, an air quality permit (if the facility has an air emission), an NDPES permit (if the facility has a discharge to public water), and a treatment facility permit. Since the applicant will be responsible for reviewing and approving the design, construction and operation of the facility, it is anticipated that the necessary operating permits can be obtained from the applicant.

b) County

A solid waste facility license will have to be obtained from the county in which the facility is located. In order to obtain a county solid waste license, the facility operator will likely be required to furnish a performance bond and the facility must meet certain operational and environmental protection criterial In addition, the county will review the design of the facility and the location of the facility to insure that the facility is consistent with the county solid waste plan. The county also has the authority to regulate user fees charged by the facility. The county will likely be the mechanism for regulating user fees based on the recommendations by the applicant.

c) Municipality

The municipality in which the facility is located has the authority to grant various building permits, utility permits and land alteration permits. The municipalities will also be given the opportunity to review and comment on the various state and county permits and licenses.

d) Other Regulatory Responsibilities

The solid waste permit must be approved by the Metropolitan Council (regional planning agency) before issuance by the applicant. By the time the facility is constructed, and industrial discharge permit to discharge liquid waste to the metropolitan sanitary sewer system will likely have to be obtained from the Metropolitan Waste Control Commission. Highway access permits will also have to be obtained from the Minnesota Highway Department.

6.8 FACILITY MANAGEMENT STRATEGY

This portion of the demonstration grant application presents the various facility management strategies to be used at the facility during routine operation. The facility management strategies are summarized according to the following activities:

- Waste Flow Management
- Management of Non-Waste Flow Activities
- Equipment and Buildings
- Project Personnel Needs During Operation
- Personnel Training Programs

6.8.1 Waste Flow Management

This section of the demonstration grant application illustrates the generalized flow of waste through the disposal facility and discusses the various waste flow management techniques that will be evaluated for incorporation into the project. A generalized waste flow diagram for the demonstration facility is illustrated on page 6-91. As shown by this diagram, waste flow through the facility will be by way of the following four major components:

- Waste Receiving
- Waste Storage
- Waste Preparation
- Land Disposal

The purpose of the following paragraphs is to discuss the various management techniques that will be evaluated for use within each waste flow component and to discuss the various transfer techniques that will be evaluated to transfer waste between the various components.

a) Waste Receiving

A brief overview of the statewide hazardous waste administrative program is needed to obtain a clean understanding of the management techniques needed at the demonstration project's waste receiving station. The overall hazardous waste administrative program being implemented in Minnesota by the applicant and by the counties includes the following assignment of responsibilities for handling hazardous waste.

Generator ——→ Transporter ——→ Treatment/Disposal Facility

Each of the three functions outlined above (Generator, Transporter, Treatment/Disposal Facility) will carry out a unique role in the proper management of hazardous waste in Minnesota. The following breakdown of responsibilities between the three functions is being implemented:

> Generator - Under the hazardous waste management system being implemented in the Minneapolis/St. Paul metropolitan area, every generator of hazardous waste will be responsible for obtaining a hazardous waste generator license from the appropriate county. The license will indicate the quantity and characteristics of the hazardous waste or wastes being generated, means of on-site storage including safety precautions, method of transporting the waste to the final treatment/disposal facility and the locations of the final treatment/disposal facilities which will be used to dispose of the generator's hazardous waste. After obtaining the license, the generator will be responsible for properly classifying the waste as hazardous and will be responsible for separating and labeling the waste consistent with the hazardous waste generator license and with the statewide hazardous waste regulations currently being drafted by the applicant. The generator will also be responsible for employing a transporter with a valid license from the Minnesota Public Service Commission to transport hazardous waste, advising the transporter of the presence of the hazardous waste and advising the transporter of the treatment/disposal facility set forth in the generator license.

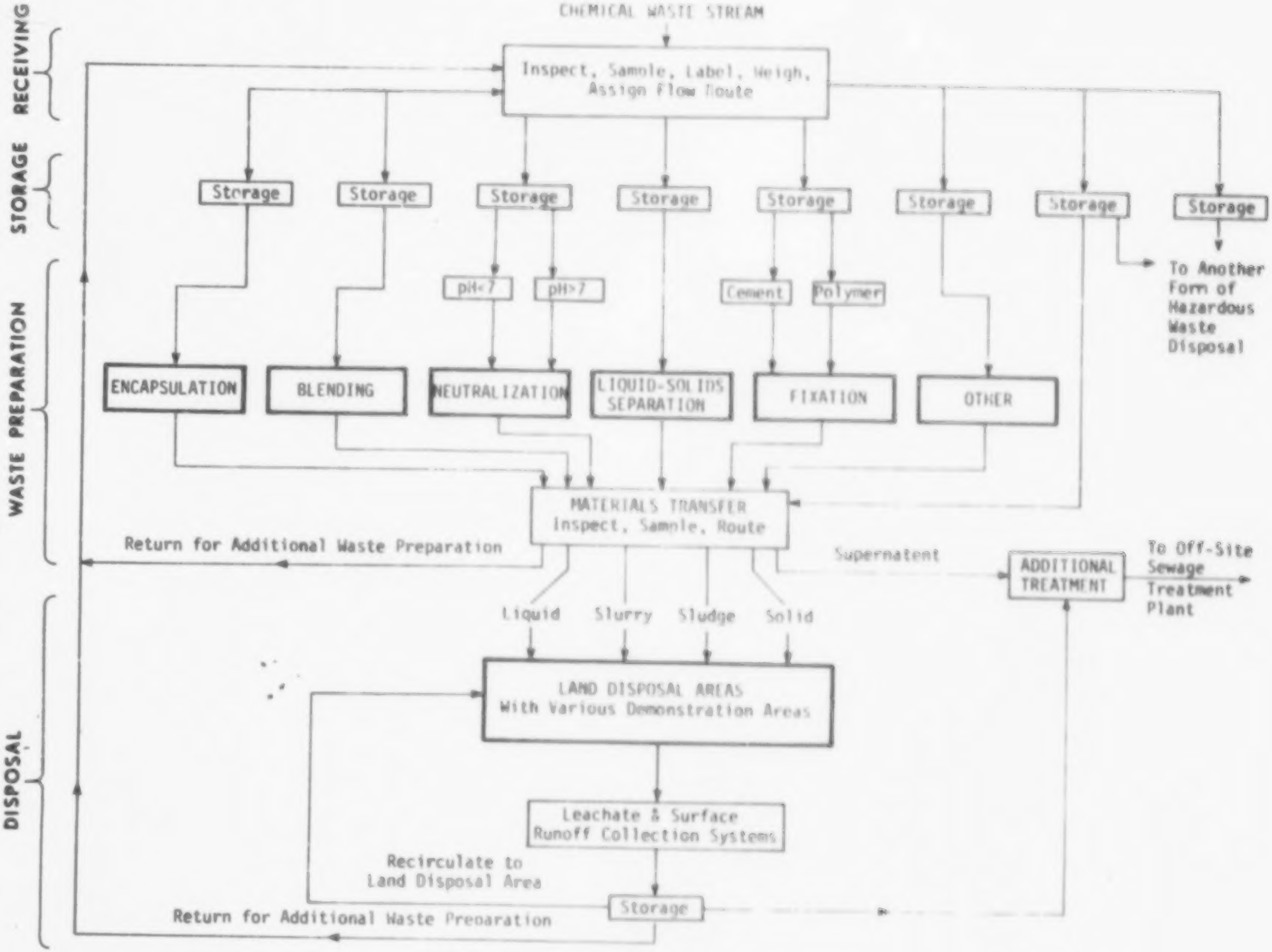

RECEIVING
STORAGE
WASTE PREPARATION
DISPOSAL
CHEMICAL WASTE STREAM
Inspect, Sample, Label, Weigh, Assign Flow Route
Storage
Storage
Storage
Storage
Storage
Storage
Storage
Storage
pH<7
pH>7
Cement
Polymer
To Another Form of Hazardous Waste Disposal
ENCAPSULATION
BLENDING
NEUTRALIZATION
LIQUID-SOLIDS SEPARATION
FIXATION
OTHER
MATERIALS TRANSFER Inspect, Sample, Route
Return for Additional Waste Preparation
Supernatent
ADDITIONAL TREATMENT
To Off-Site Sewage Treatment Plant
Liquid
Slurry
Sludge
Solid
LAND DISPOSAL AREAS With Various Demonstration Areas
Leachate & Surface Runoff Collection Systems
Recirculate to Land Disposal Area
Storage
Return for Additional Waste Preparation

FIGURE 6-9. CHEMICAL WASTE FLOW DISPOSAL FACILITY

All of the above information will be transferred from the generator to the transporter by way of a "hazardous waste shipping paper". The shipping paper will be used to describe the hazardous waste and will accompany the hazardous waste as it moves from the generator's property. The shipping paper will contain the hazardous waste characteristics and quantities contained in the shipment. The location of the permitted treatment/disposal facility as well as the name of the licensed transportation company transporting the waste will be included on the shipping paper. If all waste is going to the same treatment/disposal facility, one shipping paper will be adequate. If the shipment is to be transported to more than one treatment/disposal facility, one shipping paper should be used for each facility. Compliance with the above procedures will transfer responsibility for proper hazardous waste management from the generator to the transporter.

Transporter - Under the hazardous waste management system being implemented in Minnesota, the transporter will be responsible for obtaining and maintaining an up-to-date license from the Minnesota Public Service Commission to transport hazardous waste. Upon receiving the hazardous waste and the hazardous waste shipping paper from the generator, the transporter's responsibility will be to safely carry the hazardous waste to the treatment/disposal facility designated on the shipping paper. The transporter's responsibility for proper hazardous waste management will terminate after the waste is delivered to the treatment/disposal facility and after personnel at the treatment/disposal facility are made aware of the hazardous nature of the waste through the transfer of the hazardous waste shipping paper.

Treatment/Disposal Facility - Upon receiving the properly labeled hazardous waste along with the properly completed shipping paper, the responsibility of the treatment/disposal facility will be to treat and dispose of the hazardous waste in accordance with state, county and local regulations. A copy of the hazardous waste shipping paper will be furnished by the treatment/disposal facility to the regulatory agency issuing the hazardous waste generator license as a record of the generating source, type and volume of waste, and methods of transportation, treatment and disposal.

It is emphasized that enabling legislation to implement the administrative system outlined above has been passed by the Minnesota Legislature. The administrative system is currently being implemented by the counties and by the applicant. The complete program will be implemented at least in the Minneapolis/St. Paul metropolitan area and likely statewide, by the time the chemical waste land disposal demonstration facility is operational.

The generator licensing system being implemented in Minnesota gives the applicant the ability to plan and, if necessary, regulate the flow of chemical waste to the demonstration facility. For example, a condition of the generator license may be that the license must be obtained 60 or 90 days before waste is transported to a disposal facility. Since the license application will detail estimated waste types and quantities, the lead time will give the applicant and facility operator necessary time to plan the flow of the various wastes through the facility.

Since the final disposal location will be stipulated on the generator license, the generator license can also be utilized to regulate the flow of waste to the various hazardous waste disposal facilities. For example, if incineration of a certain waste is environmentally safer than land disposal, incineration will be stipulated on the generator license. Thus, the generator licensing system gives the applicant the necessary planning tool to predict waste quantities arriving at the demonstration facility and to divert wastes to or from the facility.

The applicant and facility operator will establish waste acceptance criteria as outlined in Section 6.7.2. These criteria will establish minimum or maximum waste characteristics (such as pH, water content, radioactivity, etc.) above or below which the waste will not be accepted. These threshold waste characteristics will be based on the waste processes and site preparation area techniques selected for incorporation into the facility. The applicant intends to avoid limiting the inflow of waste to the facility as much as possible, but the applicant recognizes that some wastes may have to be limited unless the disposal facility has the capability to prepare and safely dispose of all chemical wastes.

Waste acceptance criteria will be difficult to enforce if waste acceptance or rejection judgements must be made at the facility's receiving station. The generator licensing system will enable the applicant to enforce the waste acceptance criteria by allowing the acceptance/rejection decision to be made before the waste is transported to the disposal facility.

All chemical waste transported to the demonstration facility will be accompanied by a shipping paper summarizing the characteristics and quantities of the various wastes in the shipment. As a practical matter, it is recognized that the detail of information contained in the shipping paper will vary depending on the capabilities of the waste generator. A minimum level of detail, however, will be established by the demonstration facility operator, the applicant and the county regulatory agency. At the demonstration project's receiving station, the shipping paper will be reviewed for completeness and the waste containers will be reviewed for proper labeling. If the shipping paper or labels do not meet appropriate requirements, the waste will not be accepted. It will then be the obligation of the waste transporter to return the waste to the waste generator, who must revise the shipping paper or relabel the waste in conformance with state and county regulations and have the waste redelivered to the disposal facility.

Upon acceptance by the facility, pertinent data from the shipping paper will be recorded and the various wastes will be weighed. The objective will be to keep an accurate record of the types and quantities of chemical wastes entering the demonstration facility. A sample of each waste will be obtained and sent to the laboratory for gas chromatograph/mass spectrometer analysis. The waste will next be assigned a flow route through the demonstration facility. The flow route assigned will be based on the type of waste, as well as the demonstration needs and work load of the facility. General flow routing schedules will be developed prior to waste arrival through use of the generator licensing data. The waste will be assigned an identification number coded to the type of waste and to the flow route through the facility. All of the above activities will be carried out by the facility operator.

Once the flow route and identification code have been assigned, the waste will be separated and transferred to a storage area on the basis of the assigned initial waste preparation process. When the chemical analyses are available from the laboratory, the analyses will be coded with the waste identification number and sent to the waste preparation area where the waste is stored.

All procedures to be used in the demonstration project's receiving station will be summarized in a "Receiving Station Manual" prepared by the facility operator and approved by the applicant. This manual is necessary to avoid confusion and misunderstandings relative to the acceptance, identification, analyses, and routing of waste through the disposal facility. The facility operator will make acceptance and routing decisions using the procedures outlined in the manual. The manual will be continually updated to reflect new equipment, procedures and the most efficient and environmentally-safe methods of operating the facility. This type of communication and implementation system will be utilized at key points throughout the facility.

b) Waste Storage

Once the waste has cleared the receiving station, it will be transported to one of the various storage areas at the facility. Storage areas will be provided for each of the waste preparation techniques available to prepare the waste prior to disposal. Delivery to the storage areas will be by truck or fork lift if the materials are in barrels or drums, or by the original transport truck if the material is in bulk volume. Holding tanks will be provided at the various storage areas to store waste delivered in bulk. Once the waste is in the waste preparation storage area, additional separation will likely take place for safety purposes. For example, waste delivered to the neutralization waste preparation storage area may be stored in separate areas if the pH is less than 3, in another area if the pH is between 3 and 7, and in another area if the pH is greater than 7. Waste utilized as reagents in chemical precipitation processes may also be stored in separate areas of the storage area. Wastes will be stored in the waste preparation storage areas until sufficient quantities have accumulated to prepare a batch of chemical waste for land disposal.

Operating manuals will be prepared by the operator and approved by the applicant for each storage area. The manuals will set forth wastes to be stored in the area as well as clearly define occupational safety and health measures and waste transfer instructions.

Waste unloading and storage areas will be equipped with catch basins to collect any spilled material. All work areas will be equipped with emergency and safety equipment and apparel for employees including safety showers, independent breathing equipment, chemical and fire resistant clothing, fire-fighting devices and alarm systems to warn of hazardous conditions.

c) Waste Preparation

Once a sufficient quantity of chemical waste has accumulated in the waste preparation storage area to warrant its preparation for disposal, the quantity of waste will be transported to the actual waste preparation area. The various waste preparation areas may be located adjacent to the storage areas to save waste transfer cost. Methods used to transfer the waste from the storage area to the preparation process area will be designed in accordance with the expected waste quantities, waste types and operating conditions. As discussed in Section 6.5, a number of basic waste preparation techniques have been initially selected and additional techniques will be evaluated for incorporation into the demonstration project.

The primary purpose of the various selected waste preparation techniques will be to insure a supply of waste with a wide range of characteristics for demonstration purposes. Operating manuals will be prepared by the operator and approved by the applicant for each unit preparation process. The manuals will detail procedures to be used in the process, maintenance requirements, record keeping and waste handling precautions.

Once the waste has gone through the waste preparation process, the portion of the waste intended for land disposal will either go directly to the disposal area or into storage to await disposal. The waste may be input to another waste preparation process in which case it will be transferred to the waste storage area serving the second waste preparation process. In all likelihood, the routing decision for the waste will be made at the time the original routing was assigned. Supernatent from the waste preparation process will either go to an off-site municipal wastewater treatment facility with or without pretreatment or to a storage area prior to use in a second waste preparation process. If the waste is internally routed to another storage area, it will be weighed, labeled and analyzed, as necessary. In the early stages of the demonstration project and for nonroutine wastes, the decision whether to dispose of the supernatent at the treatment facility or reroute the supernatent through the demonstration facility will be based on the quality and quantity of the supernatent and on the needs of the facility. Once the various routing and waste disposal procedures have been established, the flow route for the supernatent will likely be a matter of routine and appropriate routing procedures and will be included in the Receiving Station Manual.

d) Land Disposal .

As appropriate, waste will be transferred from the various waste preparation processes and from the various storage areas to the land disposal areas. The waste placement techniques to be evaluated for incorporation in the demonstration project are discussed in Section 6.4.4. As discussed in Section 6.4.4, the waste may be in the form of solids, sludges, slurries or liquids so a wide variety of placement techniques and supporting equipment will be necessary.

Prior to the placement of any liners, sealants, or leachate collection facilities in the demonstration area, the area will be subdivided using a convenient grid system (a 100' x 100' grid system is recommended for preliminary discussion purposes). Sufficient horizontal and vertical grid control points will be permanently established so any portion of the grid system can be quickly re-established in the field. All wastes placed in the disposal areas will be sampled and their characteristics and location in the grid system will be recorded. In this way, a very careful record of the location of all wastes will be maintained. The leachate data collected from various sub-areas of the overall disposal area can then be compared to the types and characteristics of the waste placed over the leachate collection systems. Maintaining a careful record of the waste characteristics and locations will also facilitate recovery of valuable waste products at a future date. A large-scale map of the disposal area will be maintained illustrating the type of leachate control system used, the type of wastes deposited and the waste placement technique used in each of the grid areas. This map and supporting documents will provide an easy-to-understand reference to the management techniques used in the land disposal area. For reasons of security, disposal records will be maintained in duplicate at separate locations.

As in the other waste flow components, a Land Disposal Operating Manual will be developed by the facility operator and approved by the applicant. The operating manual will summarize the acceptable land disposal procedures as well as safety precautions and equipment maintenance procedures to be used. Record keeping will also be detailed.

6.8.2 Management of Non-Waste Flow Activities

A number of on-going management activities will be necessary to support the various waste flow management concepts outlined in Section 6.8.1. The purpose of this section of the grant application is to discuss the various necessary support activities and outline the various management techniques that will be evaluated. The following non-waste flow activities have been identified:

- Disposal Area Preparation
- Leachate Collection and Treatment
- Environmental Surveillance

Other non-waste flow management activities such as management of equipment and buildings, project personnel, and personnel training programs are discussed in subsequent subsections of Section 6.8.

a) Disposal Area Preparation

The disposal area will be prepared by the facility operator or by the facility operator's subcontractors, using plans and specifications prepared under the direction of the facility operator and approved by the applicant. The various disposal area preparation techniques to be used in the demonstration project will be based on the evaluations described in Section 6.4 of this grant application. It is anticipated that approximately 10 to 15 acres of land disposal area will be initially prepared. The area of the initial disposal site will depend on construction and equipment costs at the time of construction. Additional areas will be prepared as necessary during the progress of the demonstration project and after the demonstration period is completed using capital generated by user fees. It is emphasized that all disposal area preparation will be carried out in accordance with approved plans and specifications. No field design of disposal areas will be permitted and design changes must be approved in writing by the applicant.

b) Leachate Collection and Treatment

Leachate collection and treatment facilities will be constructed as part of the disposal area preparation activities discussed in the preceding paragraphs. All leachate collection and treatment facilities will be constructed and operated by the facility operator or his subcontractors using methods and procedures approved by the applicant. A Leachate Collection and Treatment Manual will be prepared by the applicant. This manual will set forth the allowable discharge requirements to the wastewater treatment facility, acceptable procedures for recirculating leachate through the receiving station, and general maintenance and operating procedures for using the various leachate collection and treatment systems. This rather formal means of communication between the applicant and the facility operator is believed to be necessary to avoid misunderstandings with regard to the treatment and collection of leachate.

c) Environmental Surveillance

The environmental surveillance of the demonstration project will be carried out by the applicant or by the applicant's subcontractors, This is believed to be necessary to insure the credibility of the environmental monitoring results from the project.

An annual environmental surveillance plan will be drafted by the applicant each year. This plan will summarize the air, water, soil and vegetation monitoring programs in terms of sampling frequency, sampled parameters, sample collection methods, preservatives, and storage and analyses techniques to be used during the year. All sampling and analyses methods used in the environmental surveillance program will be carried out in accordance with Environmental Protection Agency recommended procedures. The laboratory located at the disposal facility will be used by the applicant's subcontractors for the bulk of the environmental surveillance monitoring. The applicant's laboratory, which is a part of the Minnesota Department of Health, will also be used to periodically split samples to insure that proper analyses and laboratory procedures are being followed.

6.8.3 Equipment and Buildings

The following equipment and buildings will be evaluated for incorporation into the demonstration project.

a) Equipment

The equipment necessary to operate the demonstration project will include the waste preparation process equipment as well as the equipment necessary to transfer the wastes between the waste flow components discussed in Section 6.8.1. Waste preparation process and waste transfer equipment, however, have been included within the waste management processes discussed previously. Equipment will be needed to properly place the waste in the land disposal areas. It is anticipated that an earthmover, dozer and trucks will be needed for waste placement activities. The need for a crane to lift the waste into place and the need for various pumps and converyor systems will also be evaluated. A scale will be needed at the waste receiving station. Clerical equipment will be needed to carry out the clerical activities of the project. The need for a small computer in the cost accounting program will be evaluated by the facility operator and by the applicant. The decision will be based on the expected volume of business and on the cost accounting strategy used at the facility.

Fire protection and other emergency equipment will also be needed. The two selected site location have the advantage of being close to existing chemical fire-fighting equipment. The Pine Bend Site is adjacent to an oil refinery and the Flying Cloud Site is adjacent to an airport at which chemical fire-fighting capabilities are being planned. Fire-fighting equipment at the site will include foam and necessary nozzels and hose as well as a water supply system capable of producing 200 gallons per minute. Other emergency equipment to be evaluated for incorporation into the project will include safety showers, self-contained breathing apparatus, fire and chemical resistant clothing and first-aid equipment.

b) Buildings

An administrative building will be needed to house the facility manager, cost accounting department and clerical activities for the project. The administrative building will also house the environmental surveillance laboratory and data storage areas. Also included will be a meeting room for holding public informational meetings as well as two or three working offices.

An equipment storage and maintenance building will also be needed. It is anticipated that this building will be separated from the administrative building. A small building will also be needed for the waste receiving station. This building will be used for the gateman, scale and supporting equipment.

The advisability of housing the waste preparation processes and storage facilities will be evaluated by the applicant and by the facility operator. The decision whether or not to house the various waste preparation and storage areas will be based on the following evaluative criteria:

i) The need to carry out the waste preparation activities under controlled climatic conditions. Some of the waste preparation techniques may be carried out in the open even under winter operating conditions while other techniques must be housed to maintain relatively constant working conditions.

ii) The characteristics of the waste material being prepared and stored at the various facilities. It is anticipated that many wastes will remain in a workable condition under the climatic conditions experienced in Minnesota while other wastes must be housed to preserve their workability.

iii) The project budget and the costs associated with housing the various waste preparation and storage areas.

iv) Odors or emissions from waste preparation processes that require air emission control equipment will be given housing priority.

The need for storage buildings to temporarily store hazardous waste to be disposed of elsewhere as well as the need for a building to detonate shock sensitive wastes will also be evaluated.

c) Laboratory and Equipment

The need for a laboratory and supporting equipment will be evaluated by the applicant and by the site operator. At the present time, the applicant believes that a mass spectrometer, gas chromatograph and atomic absorption-graphite furnace will be needed in the laboratory. The purpose of the first two instruments is to scan leachate and incoming waste samples to identify the appropriate waste characteristics. The need to carry out other routine laboratory analyses such as metals, organic compounds, nutrients, oxygen demand, solids and the need for supporting equipment such as glassware and chemicals will be evaluated by the applicant and by the facility operator. The applicant anticipates that a large number of analyses will be necessary to evaluate the various demonstration activities included in the project as well as collect environmental surveillance data. The applicant and facility operator will evaluate the need for a rather sophisticated laboratory at the site against sending the majority of the samples to subcontractors for analyses. Of particular importance will be the expected number of samples, the capital investment and the turn-around-time that can be expected with both alternatives.

6.8.4 Project Personnel Needs During Operation

This section of the application grant outlines administrative, technical and support personnel needed to manage the demonstration facility once the facility has been constructed and is fully operational. The following personnel needs will be evaluated for incorporation into the demonstration project by the applicant and the facility operator. As discussed in 6.7.2, the applicant will approve all job descriptions for staffing the facility. The final selection of personnel will depend upon the final design of the demonstration project and on the qualifications of the personnel available at the time of selection.

a) On-Site Administrative Personnel (Facility Operator's Staff)

Facility Manager - A facility manager will be needed to assume responsibility for managing and operating the chemical waste land disposal facility. The facility manager will be responsible for the smooth operation of the land disposal facility in compliance with the requirements of the applicant. The facility manager will be the chief contact between the site operator and the applicant and will be responsible for carrying out the disposal site preparation techniques, waste preparation techniques, environmental protection activities, cost accounting strategies, and project schedule as set forth by the applicant, all within the budget approved annually by the applicant and by the Environmental Protection Agency.

Assistant Manager/Accountant - The need for an assistant manager with principal responsibilities in cost accounting will be evaluated.

This evaluation will be based on the expected volume of waste, the complexity of the selected accounting strategy and the extent of the facility management requirements.

Bookkeeper/Secretary - Secretarial and bookkeeping help will be needed to carry out the various clerical aspects associated with the project. Possible clerical duties include preparing and sending statements based on user charges, preparing payroll, answering correspondence, and other clerical activities. At least one bookkeeper/secretary will be needed and the need for additional secretarial help will be evaluated. Evaluation will be based upon the expected volume of clerical work and on the accounting strategy used at the facility.

b) On-Site Professional Personnel (Facility Operator's Staff)

Chemist/Process Coordinator - A professional level person will be needed to carry out the chemical analyses and coordinate the various waste management processes included within the facility. This includes overseeing the sampling and analyses of the water as it is received as well as sampling and analyzing the waste prior to disposal. This person will also coordinate the utilization of the various waste preparation processes and provide input to the other various chemical waste disposal demonstrations. The chemist/process coordinator will be directed by the facility manager.

Lab Assistant/Process Operator - The need for a lab assistant/ process operator to assist in the laboratory and operate the waste preparation processes will be evaluated. The evaluation will be based on the types and complexity of the waste preparation operations selected for use in the project and on the amount of chemical sampling and chemical analysis that will be carried out by the facility operator to attain the objectives of the project.

c) On-Site Technicians (Facility Operator's Staff)

Gateman - A gateman will be required to record the waste as it arrives at the project's receiving station and to check the waste labels and shipping papers as discussed in 6.8.1. This will be a relatively routine job, but will require someone on duty during all operating hours to check and accept the waste as it is received.

Equipment Operator/Maintenance - At least one equipment operator and one equipment operator/maintenance person will likely be necessary to carry out the various disposal area preparation, waste transfer, and land disposal activities associated with the demonstration facility. The need for additional equipment operators and maintenance people will be evaluated based on the number and complexity of the various disposal site preparation techniques and on the waste disposal methods selected for use in the facility.

d) On-Site Public Education Personnel (Applicant's Staff)

Technical Information Coordinator - A Technical Information Coordinator will be assigned to the demonstration project by the applicant. During the early stages of the grant period, the Technical Information Coordinator will be responsible for implementing the various public acceptance programs. Once the facility is in operation, the principal function of the Technical Information Coordinator will be to coordinate the distribution of data from the demonstration facility and to coordinate the public education aspects of the project. The coordinator will be responsible for arranging and conducting tours and seminars at the demonstration facility and for attracting local, state and national conferences to the demonstration facility. Additional details on the role of the Technical Information Coordinator are discussed in Section 6.10.2.

Tour Guides (Students) - Personnel will be necessary to conduct guided tours of the facility. It is anticipated that college students who are otherwise involved with educational projects at the demonstration facility will primarily be used to carry out this activity. The number of guides necessary to conduct tours will be based on the volume of scheduled public education activities and will vary throughout the year. Tour guides will be employed by the applicant under the direction of the Technical Information Coordinator.

e) Off-Site Personnel (Applicant's Staff)

The following personnel needs will be evaluated for use in managing the actual demonstration grant. Grant management personnel will be employed by the applicant and will likely be located off-site, probably at the applicant's offices in suburban St. Paul.

Grant Director - The Grant Director will be responsible for administering all phases of the demonstration grant consistent with Federal, state and local requirements and regulations. The Grant Director will be responsible for coordinating the work of all subcontractors employed by the applicant and will also be responsible for the timely submission of quarterly, annual and interim reports on the project. The Grant Director will be responsible for approving all facets of the demonstration project before implementation by the facility operator. The Grant Director will be responsible to the Environmental Protection Agency for all funds and other requirements associated with the demonstration project.

Grant Administrator - The Grant Administrator will be needed to assist the Grant Director in the day-to-day administrative activities associated with the demonstration project. The Grant Administrator will be directly responsible to the Grant Director for coordinating the work of the various subcontractors, for reviewing the work of the facility operator, and for administering the various portions of the grant.

Senior Engineer - A Senior Engineer will be utilized by the applicant to assist in the technical aspects of the project. The Senior

Engineer will be responsible to the Grant Director for preparing technical reports, reviewing and overseeing technical work carried out by the facility operator, and coordinating the work of the various technical subcontractors used on the project. It is anticipated that the Senior Engineer will devote approximately 50% of his time to the demonstration project. This percentage may be adjusted, depending on the specific time requirements.

Secretarial/Nontechnical - Various secretarial and nontechnical personnel will be utilized by the applicant to carry out clerical, bookkeeping, drafting and related activities. It is anticipated that a senior secretary will be necessary to carry out the clerical and bookkeeping activities and a part-time draftsman will be necessary to prepare the necessary graphics for the Public Information Coordinator and for the various reports that will be prepared by the applicant.

Other - Other technical and support people such as engineers, pollution control specialists and draftsman will be evaluated for use on the project by the applicant as appropriate.

f) Subcontractors

The need for subcontractors to assist the applicant after the grant is awarded will be evaluated by the grant director. The need for subcontractors will be evaluated after the grant is received and will be based on the staff capabilities of the applicant and on the final design of the facility. The facility operator will be permitted to retain subcontractors as necessary, although the applicant will retain approval authority over all operator subcontractors.

The following applicant subcontractor assignments have been identified for evaluation:

Environmental Surveillance - The applicant will consider retaining the University of Minnesota on a subcontract basis to carry out at least portions of the various environmental surveillance activities under the direction of the applicant. Maintaining the environmental surveillance activities under the direction of the applicant offers the advantage of independence to the subcontractor and will add credibility to the results of the environmental surveillance. Other subcontractors will be retained to carry out environmental surveillance under the direction of the applicant as necessary.

Occupational Safety and Health - The University of Minnesota will also be considered to monitor the operation of the facility to insure that the various occupational safety and health requirements are followed. The intent will be to develop an Occupational Safety and Health Plan for the operation of the facility at the outset. As with the environmental surveillance activities, it is believed that the employment of the occupational safety and health subcontractor by the applicant will help insure the credibility of the results.

Evaluation of Site Design, Waste Preparation and Disposal Techniques - Various subcontractors will be retained by the applicant to review facility designs, interpret the data obtained from the various demonstration areas and evaluate the effectiveness of the various site design and waste disposal methods. These evaluations will be prime topics for technical articles in the various technical journals and will provide valuable input to reports to the Environmental Protection Agency as well as to future demonstrations carried out at the site.

Economic and Social Impact Evaluation - Subcontractors including the University of Minnesota will also be retained to study the economic and social impact of the demonstration project on the surrounding area. Of particular interest will be the success of the various public acceptance and education programs, the impact of the facility on surrounding land development, the economic impact of the demonstration facility on chemical waste generators and on other hazardous waste disposal facilities serving the region, and the impact of the facility on the institutional framework of the various agencies presently regulating chemical wastes in this area.

6.8.5 Personnel Training Programs

The purpose of this section of the grant application is to briefly outline the various personnel training programs which will be evaluated for incorporation into the management and operation of the demonstration facility. At the present time, it is anticipated that personnel training programs in at least the following three areas will be carried out:

- Equipment Operation and Maintenance
- Facility Operation and Maintenance
- Occupational Safety and Health

The following subsections briefly describe the objectives of the various training programs that will be evaluated for incorporation into the routine operation of the demonstration project.

a) Equipment Operation and Maintenance

Proper equipment operation and maintenance is obviously important to the smooth operation of the demonstration facility. The applicant will require the facility operator to incorporate regular equipment operation and maintenance training programs into the routine operation of the facility. This will be carried out by on-the-job training as well as by classroom style presentations. An incentive program to motivate operation and maintenance personnel to attend schools relative to the equipment they operate will also be established.

b) Facility Operation and Maintenance

A basic understanding of the purposes, goals and objectives of the demonstration facility be each person employed at the facility is necessary for the successful operation of the facility. Periodic seminars for facility personnel will be held to discuss various aspects of the demonstration facility. These are considered an important part of the overall personnel training program.

c) Occupational Safety and Health

Due to the nature of the wastes handled at the facility, an occupational safety and health program will be a high priority item. An occupational safety and health plan and manual will be developed as the facility is designed and constructed. The operator of the facility will hold occupational safety and health seminars to educate facility personnel to the hazards inherent in the handling, storage and disposal of the various chemical wastes. Of particular concern will not only be preventive measures, but also control measures for accidents that do happen in the handling and disposal of chemical waste. Fire-fighting and first-aid are two examples. A comprehensive system of occupational safety and health protection will be implemented at the facility. This system will include an understanding of the chemical waste labeling systems, the prominent posting of emergency telephone numbers and the thorough training of project personnel in applying the correct control procedures if accidents do occur.

6.9 COST ACCOUNTING STRATEGY

This section of the demonstration grant summarizes the cost accounting strategies that will be evaluated for incorporation into the project. Since one of the primary purposes of the demonstration grant is to demonstrate the economic feasibility of chemical waste land disposal, the applicant recognizes the importance of cost accounting in the success of the demonstration project. All cost accounting strategies selected for evaluation will be designed to meet the following objectives:

- A system of user fees will be utilized to recover all capital expenditures as well as operating and maintenance expenses over the life of the facility. User fees will not be reduced by the demonstration grant during the demonstration period.

- Costs associated with facility closure and perpetual monitoring will be included in the user fee.

- Sufficient cost data must be developed to accurately define the unit costs associated with preparing and disposing of various chemical wastes using various waste preparation and disposal methods.

- Unit costs will be separated according to labor costs, equipment costs (capital and operating), expendable supplies, and general project overhead for cost reporting purposes.

- Non-waste handling costs such as environmental surveillance, administration, and general facility improvements will be determined and separated from unit costs associated with waste handling for cost reporting purposes.

- Costs associated with demonstration portions of the project including grant administration, public education beyond that normally included in a chemical waste land disposal facility and demonstration orientated construction and monitoring will also be determined and summarized. Demonstration orientated costs will not be included in the user fees.

6.9.1 Summary of Cost Components

The various cost components making up the total cost of the demonstration facility are summarized on page 6-113. The total demonstration project cost is separated according to direct cost, facility overhead, administrative cost, closure cost, and demonstration cost. These five cost components make up the total demonstration project cost. The costs associated with these five cost components are briefly discussed in the following paragraphs.

CHEMICAL WASTE LAND DISPOSAL FACILITY

COST COMPONENTS

	Direct Material +	Direct Labor =	DIRECT COST
	Process chemicals, encapsulation materials, & fixation materials.	All labor directly involved in the receiving, handling & storage, processing & disposal of waste.	+
Indirect Material +	Indirect Labor +	Other Indirect Expenses =	FACILITY OVERHEAD
Clothing, cleaning supplies, maintenance supplies, laboratory supplies.	Supervision, process monitoring, waste analysis, environmental surveillance.	Depreciation of process & waste placement equipment, amortization of liners & site preparation, amortization of land acquisition, amortization of design & engineering, maintenance, utilities, off-site disposal, insurance, taxes, amortization of environmental surveillance equipment.	+
		Administrative Expenses	ADMINISTRATIVE COST
		Administrative & office salaries, telephone & postage, office supplies, bad debts, legal & auditing expenses, project related public education.	+
		Closure & Perpetual Care	CLOSURE COST
		Development of closure plan, modifications to closure plan, implementation of closure plan, perpetual monitoring, contingency fund.	= TOTAL FACILITY COST* +
		Demonstration Costs	DEMONSTRATION COST
		Public education beyond normal project requirements, special testing & monitoring, salaries of tour guides, grant administration costs.	= TOTAL DEMONSTRATION PROJECT COSTS

*Cost charged to user for normal operations.

a) Direct Cost

The direct cost is made up of direct materials and direct labor. Direct materials include all process chemicals, encapsulation materials and fixation materials which will be needed as annual material inputs to the various waste preparation and disposal processes. Direct labor includes all labor directly connected with receiving, handling, storing, processing and disposing of the various chemical wastes.

b) Facility Overhead

Facility overhead includes the cost of indirect materials, indirect labor and other indirect expenses. Indirect materials include all special clothing, cleaning supplies and other maintenance supplies which will be furnished to employees directly connected with the processing and disposal of chemical waste. Indirect labor includes all labor costs associated with supervision, process monitoring, waste analysis, leachate monitoring and environmental surveillance. Indirect expenses include all expenses incurred by the facility not included as direct materials or administrative costs. These include depreciation of process and waste disposal equipment, amortization of site preparation costs, amortization of land acquisition, maintenance of equipment and buildings, utilities, off-site disposal costs at municipal wastewater treatment plants or at other chemical waste disposal facilities, insurance, taxes and amortization of design and engineering costs.

c) Adminstrative Cost

Administrative costs are comprised of administrative and office salaries, telephone and postage, office supplies, bad debts, legal costs, facility auditing expenses, and public education costs normally associated with a chemical waste land disposal facility of this type.

d) Closure Cost

As discussed in Section 6.6.2, a facility closure plan will be developed in the design stage of the demonstration project. In order to implement the facility closure plan, the costs associated with the closure plan will be recognized and added to the user fees. Costs associated with the closure of the facility include the development of the closure plan, the implementation of the closure plan, the perpetual monitoring of the site and future costs either in terms of facility maintenance after closure or modifications to the perpetual monitoring plan.

e) Total Facility Cost

The direct cost plus the facility overhead plus the administrative cost plus the closure cost represents the total facility cost. This cost will be recovered over the life of the facility through the collection of user fees. The various costs included in the total facility cost will be estimated before the facility begins routine operation. Estimates will be based on actual costs incurred during construction, actual equipment costs, engineering studies carried out during the design phase and time-motion studies conducted during the operational start-up period. The various costs will be periodically updated during the progress of the demonstration project so the full and true cost of operating the facility is charged to the facility users.

f) Demonstration Cost

Since the project is a demonstration project providing valuable data for use in other areas of the country, additional equipment, labor and expenses will be needed beyond those "normally" incurred in a chemical waste land disposal facility. It is the applicant's intention to use a portion of the demonstration grant to fulfill these demonstration-related costs. These costs will, therefore, not be passed on to facility users. Demonstration costs include public education efforts which are beyond normal project requirements, special testing and monitoring conducted to demonstrate the suitability of various site design and waste preparation processes, salaries of guides used to conduct tours of the site and grant administrative costs including the preparation of various interim and other reports.

g) Total Demonstration Project Cost

The total facility cost plus the demonstration cost equals the total demonstration project cost. This represents the entire cost of the demonstration chemical waste land disposal project.

6.9.2 Cost Control Centers

A network of cost control centers will be evaluated for incorporation into the cost accounting system. Since all waste will be assigned a route through the facility at the demonstration project's receiving station, as discussed in Section 6.8.1, the various storage, waste preparation, site preparation and waste disposal processes will be evaluated for incorporation into the accounting strategy as cost control centers. Unit costs for storing, preparing or disposing of various wastes at the selected cost control centers will be determined using actual project costs and engineering studies as well as time-motion studies conducted during facility start-up. The unit costs will be continually evaluated through the accumulation of cost data at the various cost control centers during the operation of the facility. Non-waste handling activities such as environmental surveillance, closure costs, and public education costs will also be evaluated as cost control centers. The costs incurred in storing, treating and disposing the waste can, thereby, be determined by using the unit costs from the cost control centers used in the waste flow. It is anticipated that a relatively large number of processes and, therefore, cost control centers will be necessary to meet the objectives of the demonstration project. Where appropriate, cost center data will be developed in terms of costs per unit of waste either in terms of weight, volume or chemical strength.

6.9.3 Cost Allocation Strategies

The following strategies for establishing facility user fees will be evaluated for incorporation into the project. The criteria outlined in Section 6.9.4 will be used for the evaluation. For explanation purposes, the strategies are discussed in terms of direct cost, facility overhead cost, administrative cost, closure cost and demonstration cost.

a) Direct Cost

As discussed previously, direct cost is made up of direct materials and direct labor. Standard unit direct costs will be predetermined through engineering studies conducted in the design phase of the project and through job costing and time-motion studies conducted during the facility start-up period. A record of actual direct costs will be maintained for each cost control center and the cost control centers will become monitors for measuring variances. Various strategies will be evaluated for maintaining cost records for direct costs. These strategies will include project time clocks, daily estimates of project time, and a constant allocation based on total time and total waste flow through each cost center. Analysis of variances will yield information relative to the continuing efficiency of the processes and necessary adjustments in user fees due to cost increases or other various internal or external forces. The resultant will be a unit cost for each cost control center. Units evaluated for use will include weight, volume, chemical strength, a combination of two or all three, depending on the nature of the waste and the nature of the cost control center.

b) Facility Overhead

A number of methods will be evaluated for allocating facility overhead costs into user fees. Three of these methods are discussed in the following paragraphs.

Constant Allocation Method--The total facility overhead for a one-year operating period will be predetermined through engineering and time-motion studies. In this allocation strategy, this total overhead cost is a numerator in the ultimate equation set forth below. The denominator of the equation is a formula based on the estimated annual waste volume, weight or strength. The cost allocation equation, therefore, becomes:

$$\frac{\text{Facility Overhead Cost}}{\text{Annual Volume, Weight or Strength of Waste}} = \text{User Fee to Cover Facility Overhead Cost}$$

This cost allocation method yields a single user fee based on waste volume, weight or strength independent of the processes used for waste disposal and independent of the various cost control centers. This system is the easiest to maintain, however, it does not allow for complete accuracy in allocating facility overhead costs. The facility user with easily handled waste would carry the same burden of the facility overhead as will the user with a very complex waste requiring the use of extensive preparation and disposal techniques. Depending on the facility overhead cost, the constant allocation method may not meet the cost accounting objectives of the demonstration project.

Multiple Allocation Method--Under this system, annual facility overhead costs are again predetermined through engineering and time-motion studies. Instead of allocating this cost evenly to all wastes, however, the allocation of costs to the facility user is determined by computing various cost allocation factors representing the proportion of the cost assignable to each cost control center. These factors are established for each cost control center by using the method illustrated on page 6-119.

As shown in the table on page 6-119, eight cost control centers and six allocation items have been arbitrarily selected. Cost control centers actually used in the cost accounting strategy will be selected as discussed in the previous section. The basis for allocation may include only overhead cost items or may include direct cost items which represent reasonable criteria for allocation

ALLOCATION OF FACILITY OVERHEAD COST

MULTIPLE ALLOCATION METHOD

	Project Control Centers (Based on Various Processes)							
ALLOCATION ITEMS	A	B	C	D	E	F	G	H
Percent of Direct Labor	15%	25%	5%	20%	8%	7%	15%	5%
Percent of Space Required in Project Area	8%	14%	18%	6%	30%	5%	10%	9%
Percent of Time Required for Monitoring & Supervision	10%	10%	15%	8%	7%	25%	12%	13%
Percent of Time Required for Treating Leachate	0	0	0	0	40%	20%	30%	10%
Percent of Site Design Cost	10%	17%	5%	20%	5%	13%	20%	10%
Percent of Equipment Cost	20%	15%	20%	10%	8%	7%	10%	10%
Total	63	81	63	64	98	77	97	57
Total Elements	600	600	600	600	600	600	600	600
COST CENTER ALLOCATION FACTOR	.105	.135	.105	.107	.163	.128	.162	.095
FACILITY OVERHEAD/YR.	= $200,000/yr.							
Facility Overhead Allocated Per Cost Center	$21,000	$27,000	$21,000	$21,400	$32,600	$25,600	$32,400	$19,000
Estimated Volume Through Each Cost Center (Tons)	2,000	3,000	4,000	5,000	3,000	2,000	4,000	1,000
Facility Overhead User Fee (cost/ton)	$10.50	$9.00	$5.25	$4.28	$10.87	$12.80	$8.10	$19.00

factors. The example allocations include the percent of direct labor hours required at each cost control center, the percentage of space required within the project area for each cost control center, percent of time required for monitoring and supervision at each cost control center, percent of time required for treating leachate from each cost control center, percent of facility design cost in each cost control center and the percent of equipment cost in each cost control center. The percent of the various allocations that go into each cost control center are determined using engineering and time-motion studies. The percentages are totalled and averaged to obtain a cost control center allocation factor. The cost control center allocation factor is then applied to the total annual facility overhead to obtain the portion of the facility overhead allocated to each cost control center. The estimated volume, weight or strength of waste through each cost center is determined using market surveys. Whether waste volume, weight, strength or a combination of these units are used will depend upon the waste and on the characteristics of the process utilized. The estimated waste volume, weight or strength is then divided into the facility overhead cost allocated to each cost control center to obtain a facility overhead user fee in dollars per weight, volume or waste strength for each cost control center.

The allocation item percentages are periodically updated using information generated by each cost control center during the routine operation of the facility. The user volumes are similarily updated and revised cost estimates are obtained. The multiple allocation method has the advantage that processes having a low overhead cost are reflected by lower fees for utilization of those processes.

Fixed/Variable Allocation Method--The fixed/variable cost allocation method classifies facility overhead in elements of fixed and variable costs at each cost control center. A row of cost control centers and a column of allocation items are selected as in the previous alternative. Instead of a fixed percentage, however, provisions for fixed costs and variable costs are included at each cost control center. Examples of possible fixed costs include depreciation of process and waste placement equipment, amortization of land aquisition and site design, insurance, and taxes. Examples of possible variable costs include materials, labor and expenses such as off-site disposal, leachate collection and treatment, and special site preparation procedures carried out at the cost control center which vary with waste strength, volume or weight. This variable cost will be based on the strength, volume or weight of waste. The resulting cost allocation will more closely define the costs associated with each process thereby yielding greater cost controls and additional accuracy in determining user fees.

c) Administrative Costs

The three cost allocation methods discussed in the previous paragraphs will be evaluated for use in allocating the administrative costs connected with the facility. The facility administrative costs could either be allocated with the overhead costs or allocated separately using different allocation percentages.

d) Closure Costs

At sometime the facility will reach saturation, necessitating its closure. For project planning purposes, this has been estimated at fifteen years, but increased generation of waste sludges due to wastewater pretreatment standards may shorten the estimated facility life. On the other hand, the economics of land disposal versus resource recovery or source reduction may lengthen the facility's estimated life. The hazardous nature of many of the wastes being despoited in the facility will necessitate the preparation and eventual implementation of a detailed facility closure procedure as well as the perpetual monitoring of the site. This closure and perpetual monitoring cost will be recognized from the start of operations and a closure and perpetual monitoring fund will be established over the life of the project. The cost of facility closure less expected salvage value of the equipment may be carried similar to a plant overhead item and funded from annual operations or accumulated through a separate user surcharge. The closure cost could be allocated to the various cost control centers using any of the three cost allocation methods outlined in the facility overhead discussion. A portion of the fund will be used for facility closure activities discussed in Section 6.6.2. After the facility is closed, interest from the remaining fund should be sufficient to perpetually monitor the facility. The remaining capital in the fund will be available for emergency use to maintain an environmentally-safe facility.

e) Demonstration Project Costs

All costs which are accumulated because of their demonstrative nature should be isolated through the use of one or more cost control centers. These cost items will be counted as an expense against the total venture, however, they will be ignored in determining user fees. The applicant's philosophy is that industries in the facility service area should not be penalized because the project is a demonstration project and, therefore, these costs will not be included in the facility user fees.

6.9.4 Evaluation of Alternatives

The alternative strategies for establishing cost control centers and allocating costs discussed in the preceding sections will be evaluated by the facility operator, and by their subcontractors after grant award. The cost accounting strategy will be designed by the facility operator and approved by the applicant. The selection of the cost accounting strategy to be incorporated into the project will be accomplished using the following evaluative criteria:

a) The cost accounting strategy must attain the demonstration project objectives outlined at the beginning of Section 6.9.

b) The cost accounting strategy must fit within the facility design framework in terms of cost control centers and cost allocation items.

c) The eventual cost accounting strategy must produce a user fee which is justifiable to the users of the site. The applicant and operator must be able to substantiate the costs charged to the user of the facility. These costs must accurately reflect the actual cost necessary to dispose of the user's waste.

d) The eventual cost accounting strategy must be manageable within the project budget with the personnel available at the facility.

6.10 SOCIAL IMPLICATIONS

The purpose of this section of the grant application is to discuss the various strategies that the applicant proposes to incorporate into the demonstration project to gain citizen acceptance for the project, encourage the use of the facility for educational purposes, publicize the results of the facility and monitor the social and institutional impacts of the facility. The various strategies outlined in this section of the demonstration grant application will be carried out by the applicant with the cooperation of the facility operator.

6.10.1 Strategy for Gaining Citizen Acceptance

As outlined in Section 6.1.2 of this application, Minnesota represents an excellent opportunity to field evaluate various strategies for gaining citizen acceptance for a chemical waste land disposal facility. The citizens of the area have repeatedly demonstrated a high level of interest in environmental matters and the various citizen organizations are well organized with easily identified spokesmen. Carrying out the strategies outlined in this section of the grant application will represent an opportunity to field evaluate many of the strategies set forth in the publication entitled, "Public Attitudes Towards Hazardous Waste Disposal Facilities", conducted by the Human Resources Research Organization for the Environmental Protection Agency's National Disposal Site Study.(4)

Through consultant studies, legislative hearings, and the news media, decision makers have been made aware of the generally unsatisfactory hazardous waste disposal methods currently being used in Minnesota as well as nationwide. The general public has also been exposed to the need for better hazardous waste management through the Minneapolis/St. Paul based news media. The general public attitude regarding the need for a chemical waste land disposal facility in the Minneapolis/St. Paul area seems to be generally positive at the present time. To maintain this public attitude, the various strategies outlined in this section of the grant application will be aggressively carried out by the applicant. A full-time Technical Information Coordinator will be assigned to the chemical waste land disposal demonstration project as soon as the grant is awarded. The Technical Information Coordinator will be employed by the applicant and will have a technical and public information background as discussed in 6.8.4. The function of the Technical Information Coordinator will be to coordinate and carry out the bulk of the work in implementing the various citizen acceptance strategies. Once the various environmental and construction permits have been obtained, the Technical Information Coordinator will coordinate the various public education programs which are to be implemented around the facilities. These public education categories are summarized in Section 6.10.2.

The overall strategy for maintaining a positive public attitude toward a chemical waste land disposal project has been divided into two separate phases. The first phase will concentrate upon selling the need for the facility in Minnesota and the second phase will concentrate upon selling the facility at the chosen location. The Phase I strategy for gaining citizen acceptance for a chemical waste land disposal facility will follow the following outline:

a) Sell the nationwide need for such facilities. The general theme of this portion of the strategy will be:

> "We must improve our present methods of chemical waste disposal. Lack of adequate methods are significantly damaging the public health, safety and welfare locally and on a nationwide basis. The problems associated with inadequate chemical waste disposal will increase in the near future as discharges to sanitary sewer

systems are curtailed. A chemical waste land disposal facility under carefully controlled and monitored conditions is an important part of improving our present methods of managing our waste products and presents a technological leap beyond present disposal systems. A demonstration facility is needed to determine if the land disposal of chemical waste can be carried out in an environmentally-safe and cost effective manner."

b) Sell the need for such a facility in Minnesota. Proof in the form of case histories will be presented documenting the damage to public health, safety, and welfare that is presently occurring through the uncontrolled disposal of chemical wastes. It will be stressed that damage associated with the uncontrolled disposal of chemical waste will be compounded in the near future when the discharge of chemical waste to the sanitary sewer system is curtailed.

c) Sell the fact that the project is a Federal Demonstration Project under the sponsorship of the U.S. Environmental Protection Agency and that 3.5 million dollars of Federal support will be granted to help build and operate the facility.

d) It will be stressed that the demonstration project represents the opportunity for governmental regulatory agencies to select a site for the facility in the best possible location to minimize environmental impacts. The only alternative is to react to disposal locations and operational plans brought to the regulatory agencies either by industry or by another governmental agency. These site locations might not be as ideally located from an environmental, economic or land use point-of-view as the demonstration facility. The fact will be stressed that the area needs a chemical waste land disposal facility. The choice is not between locating or not locating a site in the area. The choice is only between the various ways to locate the site in the area and the demonstration facility route is clearly the best way to go.

e) Stress that a chemical waste land disposal facility will encourage the recovery of valuable chemical byproducts and the reduction of waste generation at the source since:

i) The cost of disposal in the chemical waste land disposal facility will represent the true cost of proper land disposal of chemical wastes and will make the economics of many resource recovery and source reduction techniques more attractive.

ii) The use of a chemical waste land disposal facility will place potentially valuable materials in a known location, thereby making recovery and reclamation of today's waste products more feasible at a future date.

iii) The construction of a chemical waste reclamation and recovery facility will be an obvious addition to a chemical waste land disposal facility. In fact, the predisposal preparation of many wastes could eventually lead to the recovery and reuse of many valuable resources.

f) It will be stressed that the Minnesota Pollution Control Agency, the agency responsible for protecting the environment in the State of Minnesota, supports the need for the project and will be the administrator of the demonstration grant. The project will be designed and constructed with a number of fail-safe levels of waste containment to insure an environmentally-safe facility. The facility will be thoroughly monitored to insure that all waste containment procedures are functioning properly.

The program detailed above, represents a first phase strategy to gain citizen acceptance for the facility. The applicant will stress the basic need for the project and will not cloud the issue with site specific details in the early stages of the citizen acceptance program. The first phase program will be directed at statewide in general with particular emphasis on the metropolitan area. State, regional, county and selected local decision makers will be contacted with a project overview and a definition of the need for the project. In addition, spokesmen for the various environmental groups active in the metropolitan area will be contacted also with a project need definition and with a project overview. This will result in a good understanding of public attitudes and a sample of the types of rallying points likely to arise when actual site location is discussed in the second phase of the strategy.

The applicant has already initiated critical portions of this first phase program to gain citizen acceptance for a chemical waste land disposal facility in the Minneapolis/St. Paul area. Initiatives taken to date include:

a) The formation of a Hazardous Waste Steering Committee which has been working on metropolitan and statewide hazardous waste management problems for approximately three years. The Steering Committee is made up of decision makers (or their representatives) who will be making many of the decisions regarding the eventual implementation of a hazardous waste management system in Minnesota. Industry representatives are also members of the Hazardous Waste Steering Committee.

b) The report quantifying the generation of hazardous waste in the metropolitan area was given excellent publicity by the media in the Minneapolis/St. Paul area. The various news reports stressed that unregulated hazardous waste disposal methods were currently being used and pointed out the need for better disposal methods.

c) Minnesota's application for the chemical waste land disposal demonstration grant was given excellent news coverage in the Minneapolis/St. Paul area. The coverage stressed the need for better disposal facilities and pointed out that the applicant has been selected as one of the seven nationwide applicants for a Federally supported demonstration project.

All of the information on the various hazardous waste efforts released to date has been well received by the public. No negative feedback has been received from industry, environmental groups or from the public in general.

The second phase of the citizen acceptance program will be to gain citizen acceptance for a specific site. The major portion of this effort will obviously be carried out in the geographical area surrounding the potential site. After award of the demonstration grant, the suitability of potential sites will be discussed in detail with local decision makers. If, after these discussions, a final site location cannot be selected, the strategies outline in the following paragraphs will be carried out and the most successful site from a citizen acceptance point-of-view will be selected. If an early decision can be made, the following strategies will be carried out only at the selected site.

The general strategy for gaining local support for a specific site will be to point out that the facility will be a model facility supported by the Federal Government. It will be demonstrated through appropriate question and answer brochures with technical support, that the chemical waste land disposal facility will not contribute to any form of environmnetal degradation.

Potential rallying points for opposition to the site specific project will be identified. Among these rallying points are likely to be: safety during transportation, long-term impact on local water supplies and short-term and long-term impact on land values. Specific answers to these rallying points will be identified and enumeated in illustrated brochures with question and answer formats For example, answer to the question of transportation safety , it will be pointed out that all vehicles transporting chemical waste will be licensed by the Public Service Commission and routes to the disposal facility from the major centers of generation will be Interstate Freeways and major four-lane roadways. The impact on water supply will be discussed in terms of the environmental protection measures to be utilized at the site and the location of the site relative to ground water use for potable water supply purposes. The negative impact on land values will be minimized by showing that the facility will be located in an industrial area, by pointing out that screening will shield the facility from view and by assuring that there will be no odors or emissions from the facility.

Targets for acceptance will be key decision makers at the state, regional and local levels and the local population around the specific site. Tools for carrying out the strategy will include:

a) Brochures detailing the need for the facility by illustrating problems with the present chemical waste disposal methods as well as future problems that can be expected without adequate disposal facilities.

b) Question and answer brochures giving facts relative to the potential rallying points for opposition to the site.

c) A press information kit for use by the various environmental reporters working for local newspapers, radio and television.

d) A site plan model showing the site, the surrounding area, the disposal techniques and the environmental protection facilities.

f) A slide presentation illustrating the site area in its natural condition with overlays illustrating the proposed site plan.

Use of the strategies outlined in this section along with the location of the facility and the environmental protection measures set forth in other sections of this application hopefully will result in the issuance of the appropriate construction and operating permits for the facility. Once the construction and subsequent operation of the facility is underway, the citizen acceptance program will take the form of the public education program discussed in the following section of this application.

6.10.2 Use of Facility for Educational Purposes

As the chief environmental advocate in Minnesota, the applicant recognizes the need to use the demonstration facility as an educational aid illustrating an environmentally-safe method of chemical waste disposal. The following general strategies will be followed by the applicant with the cooperation of the facility operator to develop the educational potential of the facility.

a) The Technical Information Coordinator, discussed in 6.8.4 and 6.10.1, will be assigned the responsibility of coordinating the use of the facility as an educational aid. His responsibilities will include:

   i) promoting, organizing and overseeing seminars, workshops and specialty conferences structured around the demonstration facility. The conferences could either be held at the facility or at a neighboring meeting place.

   ii) promoting, organizing and conducting tours through the entire facility or through selected portions of the facility. Tours will be scheduled for the general public, for interested local, regional and state decision makers, and for interested individuals and groups from outside the state. After the facility is in operation, the Technical Information Coordinator will have a staff of guides (possibly students working on various subcontracts) to conduct tours.

   iii) disseminating environmental surveillance, cost accounting, and process operational data generated by the facility to interested individuals, institutions, agencies and industries throughout the world. It is anticipated that the facility will become a technical information center for the land disposal of chemical wastes. A library will be maintained not only for data generated by the project, but also for data and reports generated by other studies carried out on the land disposal of hazardous waste.

iv) write informational articles and press releases relative to the facility for newspapers, radio and television as well as for such special interest magazines as Public Works, American City, Water and Wastes Engineering, etc.

v) coordinate, for the applicant, any research or research related activities carried out at the facility.

vi) communicate and meet with other people, with state and regional solid waste management responsibilities to gain their input into facility operations.

b) Various departments of the University of Minnesota (School of Environmental Health, Department of Civil Engineering, Department of Chemical Engineering, Geology Department) will work the demonstration facility into various courses concerned with waste management, environmental surveillance, waste treatment, occupational safety and health and social science. Classes will be conducted at the facility and data generated by the facility will be utilized in courses held at the University of Minnesota. In this way, the facility will become a teaching aid and will provide a direct educational experience for new people in the field of hazardous waste management.

c) As discussed in Section 6.8.5, the applicant may subcontract directly with the University of Minnesota for work in at least the following three areas:

- Environmental Surveillance
- Occupational Safety and Health
- Social Impact Monitoring

Subcontracting directly with the University of Minnesota will allow the University to incorporate work at the facility into its graduate level programs. It is anticipated that three or four masters level theses and one or two doctorate level theses per year can be developed around the facility. In this way, the project will be providing a very detailed educational experience to new people in the field of hazardous waste management.

d) The University of Minnesota, as well as other universities and colleges in the area and nationwide, will be encouraged to use the chemical waste demonstration facility as an incentive to obtain research grants to study various facility aspects and facility impacts in greater detail than can be accomplished under the demonstration grant. The applicant clearly understands that the primary purpose of the facility will be to demonstrate new and improved chemical waste land disposal techniques, but research at the facility without using demonstration funds will be encouraged as long as the research does not conflict or impede the efficient operation of the facility.

6.10.3 Publicizing Project Results

The applicant recognizes the critical importance of publicizing the data and conclusions generated by the demonstration project. The following strategies have been developed to publicize the project.

a) As discussed in the preceding section, the Technical Information Coordinator will be responsible for publicizing the project to the local news media.

b) The Technical Information Coordinator will also be responsible for preparing "general interest" articles of a semi-technical nature for publication in such magazines as Public Works, American City, Civil Engineering and Water and Waste Engineering. It is anticipated that the Technical Information Coordinator will be able to publish two or three semi-technical articles per year during the five-year demonstration period.

c) Proceedings of the various seminars, workshops and conferences which focus on the facility will be published and distributed. It is anticipated that one national conference and four to five local seminars per year can be focused on the facility during the five-year demonstration project.

d) The University of Minnesota belongs to the Committee on Institutional Cooperation which is an inter-institutional committee of Big Ten universities plus the University of Chicago organized to share opportunities and avoid unnecessary duplication in research activities. Data from the demonstration project will, therefore, be formally made available by the University of Minnesota to the universities on the committee as well as upon request to any other interested institutions.

e) As a part of the subcontract agreements, universities and other subcontractors will be required to publish the data and conclusions of their work in a technical journal. It is anticipated that three or four technical articles per year will be generated during the five-year demonstration period.

f) The annual reports, the interim reports on special areas of study and the final project report will be printed in sufficient quantities so they can be distributed to interested individuals, institutions, agencies and industries upon request.

g) The applicant will prepare at least one technical article for publication in a technical journal during each year of the demonstration project.

h) The applicant will attempt to organize a subcommittee of the state solid waste administrators to review project data and operations and make comments regarding project operation and design.

6.10.4 Monitoring the Social Impact of the Facility

The social impact of the facility on the surrounding area will be monitored as the project is implemented. Of particular interest will be the success of the various public acceptance and educational programs, the economic impact of the facility on chemical waste generators and on other hazardous waste disposal facilities serving this area and the impact of the facility on the institutional framework of the various agencies presently regulating chemical wastes in this area. This monitoring program will be carried out either by the applicant or by the applicant's subcontractors. The information gained in the monitoring program will be published in an interim report to the Environmental Protection Agency.

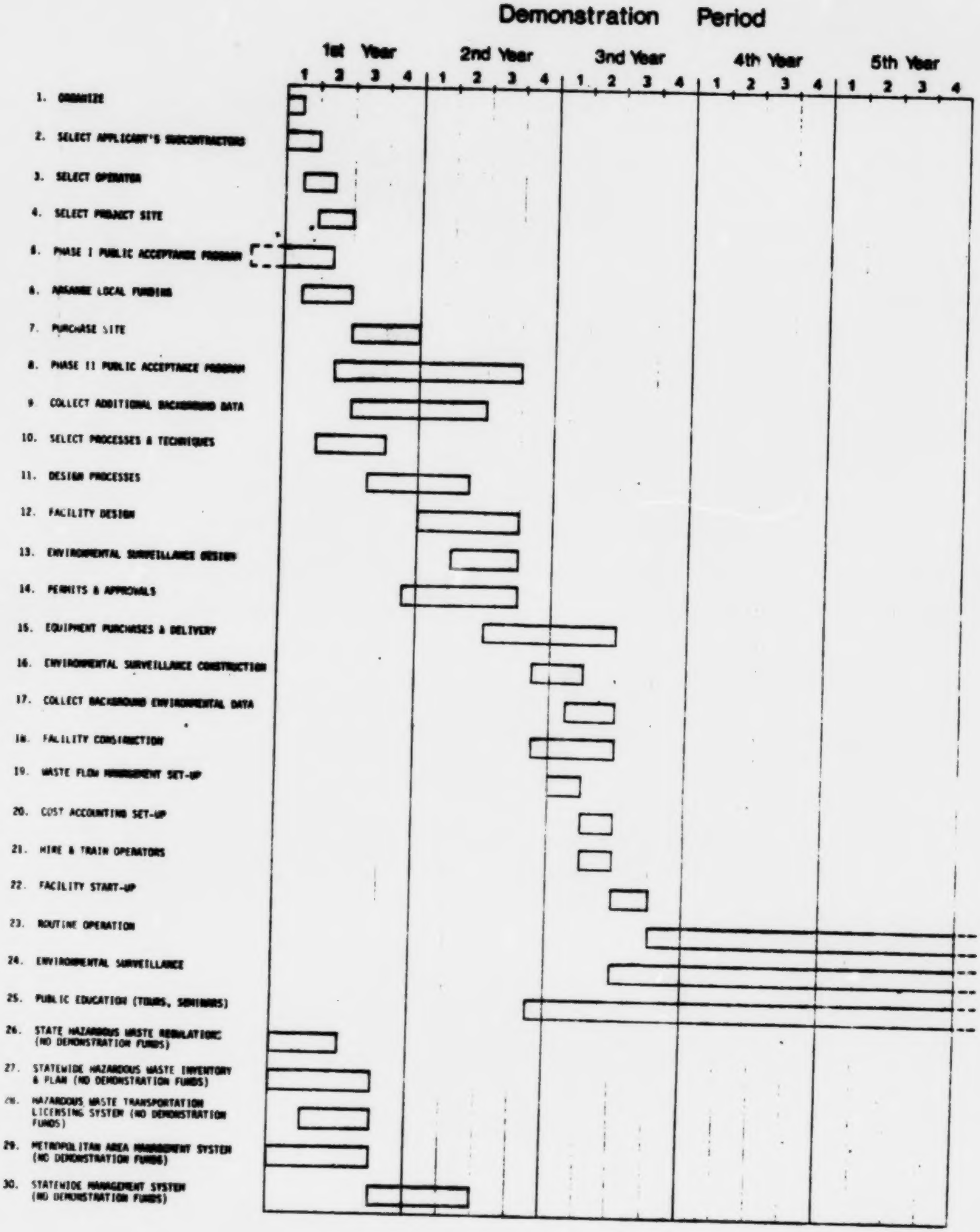
6.11 IMPLEMENTATION SCHEDULE

A generalized schedule for implementing the demonstration grant is illustrated on page 6-135. The purpose of this section of the application is to discuss the various scheduled items outlined on page 6-135 in terms of item inputs, expected outputs and implementation strategies.

1. Organize

Immediately after award of the demonstration grant, the applicant will organize and prepare to administer the grant. Organizational activities will include: backgrounding the various personnel, setting up cost accounting methods, issuing work orders to administer the grant, sending the Solicitation of Interest to qualified operators if the county ownership/private sector operator alternative is selected, and signing necessary contracts and agreements with the intermediate governmental agency selected to own the site. Inputs to this work item will be EPA reports on hazardous waste management, state reports on hazardous waste management and EPA/state discussions relative to the demonstration project.

CHEMICAL WASTE LAND DISPOSAL DEMONSTRATION PROJECT
IMPLEMENTATION SCHEDULE



2. Select Applicant's Subcontractors

Immediately after award of the demonstration grant, the applicant will select subcontractors for the early portions of the applicant's work program. Early in the project, it is expected that the applicant will obtain subcontract assistance in site and operator selection and process selection and design review. All subcontractors will be selected by sending out proposal requests to various consultants. A number of qualified consultants for the various subcontracting assignments will be selected. Contracts will then be prepared and the work scope detailed. The applicant is interested in working with the University of Minnesota in such areas as environmental surveillance, compliance with occupational safety and health requirements and monitoring of social and institutional impacts of the project. These subcontracts, along with other consultant subcontracts need not necessarily be finalized at this early stage. Although not shown on the Implementation Schedule, other subcontractors will be selected as necessary during the demonstration period.

3. Select Operator

After the applicant has organized the various grant administrative activities, the three or four most qualified site operator applicants will be interviewed by the applicant and by the Hazardous Waste Steering Committee if the county ownership/private sector operator is selected. As discussed in Section 6.7.4 of this application, Solicitation of Interests will be sent to approximately nine potential site operators. Replies to the Solicitation of Interest will be evaluated by the applicant and the three or four most qualified operators will be interviewed. Based on the interviews and on the qualifications of the applicants, a site operator will be chosen by the applicant using the advice of the Hazardous Waste Steering Committee. Operator selection criteria are summarized in Section 6.7.4.

4. Select Project Site

As set forth in the grant application, two potential project sites have been selected and environmental impact appraisals have been prepared on both sites. After award of the grant, the institutional impacts of locating the facility at the two locations will be evaluated along with the probability of obtaining permits from the county and local units of government. Based on these evaluations and on additional data collected after submittal of the grant application, the final site will be selected for the demonstration project. The applicant is confident that the necessary approvals can be secured to utilize one of the two potential sites.

5. Phase I Public Acceptance Program

As discussed in Section 6.10.1, an aggressive public acceptance program will be implemented to "sell" the need for improved chemical waste disposal to the public. Phase I of this program involves a detailed explanation of the need for the project nationwide as well as within Minnesota. Phase I of the program will, therefore, focus on the need for the project and not on site-specific details. This phase of the project has already been implemented as outlined in Section 6.10.1 and will continue as the project site is finalized. Output from this item will be informed public officials who recognize the need for improved chemical waste disposal facilities.

6. Arrange Local Funding

As discussed in Section 6.7.1, the local share of the demonstration project funding will be provided by either the counties or the Metropolitan Waste Control Commission through revenue bonds. Included in this work item are the preparation, advertisement and selling of the bonds.

7. Purchase Site

This work item includes the negotiations and purchase of the selected project site. Condemnation, if necessary, will be carried out to secure the site.

8. Phase II Public Acceptance Program

As the site is being selected, Phase II of the public acceptance program will be implemented. As outlined in 6.10.1, Phase II includes "selling" the public on the merits of the selected site. The statewide and metropolitan area need for the site will be stressed on a continuing basis.

9. Collect Additional Background Data

After the site has been selected, additional background data may be needed as input to the design of the facility and environmental surveillance systems. Additional background data may include soils and subsurface geology data. Additional data may also be needed on the depth and influence areas of wells surrounding the project.

10. Select Processes

Early in the first year of the demonstration period, the various waste preparation and site preparation strategies outlined in Section 6.4 and 6.5 of the grant application will be evaluated. The evaluation will be carried out by the operator and by the applicant using the appropriate evaluative criteria outlined in the grant application. Output from this work item will include the waste preparation and site preparation processes to be designed and included within the demonstration facility.

11. Design Processes

After the waste preparation and site preparation processes to be incorporated into the facility have been selected, the design of the various processes will begin. The process design will include the preparation of detailed plans and specifications to construct the various waste preparation and site preparation processes. The plans and specifications will be prepared by the facility operator and approved by the applicant. Outputs from this work item will be used to order the equipment, design the facility and construct the various selected processes.

12. Facility Design

After the site has been purchased and necessary additional background data has been collected, the final design of the facility will be completed. The final facility design will include the preparation of plans and specifications for roads, storage areas, parking areas, buildings, disposal areas and other supporting facilities. The plans and specifications will be prepared by the facility operator and approved by the applicant. Output from this work item will be used to order equipment and construct the facility.

13. Environmental Surveillance Design

As the waste management processes and site are being designed, the design of the environmental surveillance system will also be completed. Environmental surveillance design will include specifications for all monitoring wells, piezometers, soil core areas, air quality monitoring stations, surface water monitoring facilities, sample collection methods and sample analysis methods. It will also include the design specifications for the environmental surveillance laboratory. Output from this work will be utilized to order equipment and construct the environmental surveillance system.

14. Permits and Approvals

After the project site has been selected and after the process design and site design have been carried far enough to serve as input, the various permit applications will be prepared and submitted. This will include a solid waste license from the appropriate county; building, land alteration and utility permits from the appropriate municipality; solid waste, air quality and water quality permits from the Minnesota Pollution Control Agency and approval of the solid waste permit by the Metropolitan Council. A state environmental impact statement may also be required if the project is found to be of more than local environmental significance. As the process and facility designs are finalized, the final designs will be submitted in support of the permit applications.

It is expected that approximately nine months will be required to obtain the necessary permits and approvals.

15. Equipment Purchase and Delivery

As the various process and facility designs are completed, the equipment will be ordered, purchased and delivered. The applicant recognizes the need to allow a considerable lead-time for equipment delivery.

16. Environmental Surveillance System Construction

After the environmental surveillance system has been designed, construction will immediately begin. The applicant recognizes the importance of the early construction of the environmental surveillance system so background data can be collected prior to the disposal of waste at the site.

17. Collect Background Environmental Data

After construction of the environmental surveillance system, background environmental data will be collected. Data will be collected over a six-month period with sufficient frequency to measure the background levels of all critical parameters. It is obviously important to collect this background environmental data before waste is actually deposited in the facility.

18. Facility Construction

After the facility design has been completed, construction of the facility will begin. It is estimated that approximately six months will be needed to construct the roads, buildings, storage and waste preparation areas and disposal areas at the facility.

19. Waste Flow Management Set-Up

During the intermediate stages of site construction, the various waste flow management techniques discussed in Section 6.8.1 will be evaluated and a waste flow management strategy will be selected. The evaluation and selection will be conducted by the facility operator and approved by the applicant using the evaluative criteria outlined in Section 6.8.1. The operating manuals for the demonstration facility's receiving station, the various waste preparation processes, and the various site preparation techniques will be developed during this work item. The output from this work item will be the established waste flow management system designed to insure the efficient and environmentally-safe operation of the facility.

20. Cost Accounting Set-Up

During the later stages of site construction, the cost accounting strategies outlined in Section 6.9 will be evaluated and a cost accounting strategy which best fits the evaluative criteria will be selected. The necessary procedures to carry out the cost accounting strategy will be developed during the work item. The result will be the development of a cost accounting strategy to insure that the project fulfills the demonstration objectives set forth by the applicant and by the Environmental Protection Agency.

21. Hire and Train Operators

During the later stages of site construction and after most of the necessary equipment is delivered, the personnel necessary to operate the disposal facility will be hired. Job descriptions will be developed by the site operator and approved by the applicant. The site operator will then fill these job descriptions with the most qualified personnel available. After the necessary personnel are hired, they will be orientated in waste flow management, cost accounting as well as in the use of the various waste preparation processes and waste disposal facilities and supporting equipment.

22. Facility Start-Up

After the site is constructed and after the operators are hired and orientated, a three-month project start-up period will be carried out.

The purpose of the project start-up is to identify and remove any "bugs" that may exist in the overall operation, to obtain unit cost data on the various cost control centers through job costing and time-motion studies and to provide additional orientation time for the various personnel needed to operate the site. The output of the start-up period will be an efficiently operating facility with established waste disposal fees.

23. Routine Operation

After the three-month facility start-up period is completed and the facility is running efficiently, the facility will be opened for routine operation. Critical activities in the routine project operation will be implementing the various demonstration techniques selected for use in the project, maintaining close control on costs at the various cost control centers, monitoring liner and waste preparation process effectiveness and the routine environmental surveillance which will be used to insure an environmentally-safe facility.

24. Environmental Surveillance

During project start-up, the environmental surveillance monitoring system will be implemented. This system will be utilized to insure that an environmentally-safe operation is being conducted.

25. Public Education

During construction of the facility, a public education program will be implemented. The purpose of this program will be to educate the public regarding the operation of the land disposal facility. Public education programs will be carried out through the printing of informational brochures and through tours and seminars conducted at the facility. This public education effort will continue until the end of the demonstration project.

26. State Hazardous Waste Regulations

As discussed in Section 6.2, the applicant is currently adopting statewide hazardous waste regulations. These regulations will be promulgated during mid-1975. These regulations will guarantee a supply of chemical waste to the land disposal facility. No demonstration project funds will be utilized in implementing the hazardous waste regulations.

27. Statewide Hazardous Waste Inventory and Plan

As discussed in Section 6.2, the applicant has requested and received proposals from a number of consultants to conduct a statewide inventory of hazardous waste generation and develop a statewide strategy for managing hazardous waste. A metropolitan area inventory and metropolitan area plan have been completed by a consultant to the counties and to the applicant. No demonstration funds will be utilized in carrying out the statewide inventory or in the development of a statewide plan. The results of the statewide plan, however, will be very important to the success of the demonstration project.

28. Hazardous Waste Transportation Licensing Program

As also discussed in Section 6.2, a statewide hazardous waste transportation licensing system is being implemented in Minnesota. The purpose of this licensing system will be to insure that hazardous waste is transported in accordance with appropriate safety procedures. The licensing system is being implemented by the applicant and by the Minnesota Public Service Commission. No demonstration funds will be utilized for implementing the hazardous waste transportation licensing system.

29. Metropolitan Area Hazardous Waste Management System

A hazardous waste management system is currently being implemented by the counties in the Minneapolis/St. Paul metropolitan area. This system includes a generator licensing program which requires that all generators of hazardous waste obtain a license from the appropriate coun . This license sets forth the type and quantity of generated waste and disposal method. The metropolitan area management system will be implemented during 1975. No demonstration funds will be utilized for the implementation of the metropolitan system although the demonstration facility will be a critical component of the system.

30. Statewide Hazardous Waste Management System

After completion of the statewide hazardous waste inventory and statewide hazardous waste plan, a statewide hazardous waste management program will be implemented. No demonstration funds will be utilized to implement the statewide program, although the demonstration facility will be a critical component of the statewide program.

6.12 PROJECT BUDGETS AND FUNDING STRATEGY

This section of the grant application summarizes budgets and funding strategy that will be utilized to implement the demonstration facility.

6.12.1 Project Budget Categories

Annual budgets for the five year demonstration period have been projected using the Table A cost categories from Section E of EPA Form 5700-12. The detailed annual budgets are included on page 6-152 through 6-163. The size and complexity of the facility may have to be adjusted to stay within the budgets available from the various funding sources. The following paragraphs summarize the various budget categories.

a) Personnel Salaries

The budget figures included in this item are salaries for staff time anticipated to be utilized by the applicant in administering the demonstration grant. The detailed job descriptions of the various administrative personnel are discussed in Section 6.8.4.

An annual salary increase of 8 percent has been used to project personnel salaries. It is emphasized that figures contained in this budget category are to be utilized for grant administrative purposes and do not include the salaries for the facility operator. Facility operator salaries, fringe benefits and all subcontract assistance are included under Contractural Personnel Services.

b) Fringe Benefits

Fringe benefits provided by the applicant are estimated to be 15 percent of base salary. These fringe benefits include health insurance, sick leave, life insurance, annual leave and retirement.

c) Travel

The budgeted figures for travel are projected on the basis of the applicant's policy for allowable travel expenses. Trips to Washington, D. C., and Chicago, Illinois, have been included for the purpose of discussing the project with Environmental Protection Agency personnel. Travel costs associated with these trips represent airline fares. Meals, lodging and parking have been estimated at $35 per day for the first year and $40 per day for the next four years of the demonstration period. It has been assumed that each trip will result in a one "day" of meals, lodging and parking expense. Travel by car has been estimated at $.14 per mile during the first year of the demonstration period, at $.16 per mile during the second and third year of the demonstration period, and at $.18 per mile during the fourth and fifth year of the demonstration period.

d) Equipment

Equipment costs have been estimated for the overall project. During the first year of the demonstration period, equipment costs will be consumed by establishing office space and necessary equipment to support the applicant's staff on the project.

First year equipment includes a typewriter, filing cabinets, desks, chairs, bookcases and a dictaphone. During the second year of the demonstration period, approximately two-thirds of the equipment needed to operate the demonstration facility will be purchased. This includes site preparation and waste placement equipment, waste preparation process equipment, office equipment for use at the site, and laboratory equipment. During the third year of the demonstration period, the remaining equipment needed to operate the facility will be purchased. This includes the balance of the waste preparation process equipment, laboratory equipment, fire protection and safety equipment and the environmental surveillance equipment. During the fourth and fifth years of the demonstration period, money has been budgeted for purchasing a small amount of additional equipment needed to operate the facility and to maintain previously purchased equipment. The actual cost of equipment is obviously impossible to estimate until the various processes have been selected.

e) Supplies

The budgeted money for supplies are shown at a projected actual cost to the applicant. Printing and reproduction costs have been estimated at $.07 per page during the first year of the demonstration period and at $.08 per page during the second, third, fourth and fifth year of the project. Postage has been estimated at a fixed cost per month based on the experience of the applicant in administering other grants. The cost of purchasing general office supplies such as pencils, erasers, paper and envelopes has also been projected.

f) Contractual Personnel Services

As discussed in Section 6.8.4, the applicant will utilize subcontractors for various portions of the grant administration activities. Contractual personnel service budgets between the applicant and various subcontractors have been estimated for site and operator selection assistance; process selection and design review; environmental surveillance design; social impact evaluation; inspection of site construction, start-up and operation; collection of background environmental data and collection of environmental data during facility operation. These contractural personnel service budgets will be administered by the applicant. All subcontracts will be written with a fixed upper limit so the budgeted amounts will not be exceeded. A contractural personnel service budget for the facility operator has also been included under this budget category. An annual budget will be submitted by the facility operator to the applicant. This annual budget will include all salaries, fringe benefits, overhead, travel, supplies (except equipment), and materials to plan, design, construct and operate the facility including all subcontracts administered by the facility operator. All facility operator subcontracts must be approved by the applicant. The operator's contractural personnel services budget does not include facility equipment and construction costs. These items have their own budgets and are discussed separately.

g) Construction

As illustrated in the implementation schedule, the construction of the facility will begin during the second year of the demonstration period. A construction cost estimate has been developed for the construction of the facility. This estimate is shown on pages 6-149 and 6-150. Total construction cost of the facility, excluding equipment, but including land, has been estimated to be $2,716,000. Construction cost will, of course, vary depending on the actual site. For example, a longer access road and a longer sanitary sewer system are needed at the Flying Cloud Site than at the Pine Bend Site. On the other hand, more water supply wells will be lowered at the Pine Bend Site than at the Flying Cloud Site. The budgeted construction cost represents an estimate that will require re-evaluation when the final site is selected. Detailed construction budgets will, of course, be prepared during the design of the facility and will be included in the annual grant continuation requests. The size of the initial facility will be structured to stay within the indicated budget or additional funds will be obtained to supplement Minnesota's share of the demonstration grant.

h) Other

This budget category includes project costs to administer the grant and carry out the demonstration project not included in other budget categories. Legal support will be needed to prepare and approve various contracts with the facility operator and with subcontractors, to purchase land for the facility and to give legal advice to the applicant regarding various grant administrative activities. Telephone costs for long distance and local calls plus additional telephone service have been estimated. Land costs have been estimated based on the price of land in the two site location areas. Insurance for the applicant has been included. The applicant will supplement its present staff to assist in the various grant administrative activities and, therefore, personnel recruiting costs have been included. The applicant will also prepare various graphics for the public education program and for the various project related reports and the cost of printing these graphics has been included. The applicant may utilize a computer for project scheduling and project budget purposes so the cost of a small amount of computer time has been included. The applicant will obtain additional office space to administer this grant, therefore, the cost of renting this office space has been included. The Environmental Protection Agency also requires that an audit of the demonstration project be carried out annually, therefore, the cost of the audit has been included.

6.12.2 Budget Summary

The annual budgets, illustrated on pages 6-152 through 6-163, are summarized below according to cost category and demonstration period. Federal, nonfederal and user fees needed to fund the annual budgets area also included in the table on the following page.

	First Year	Second Year	Third Year	Fourth Year	Fifth Year	TOTALS
Personnel Salaries	$ 51,100	$ 62,945	$ 72,632	$ 61,560	$63,210	$ 311,667
Fring Benefits	7,665	9,442	10,895	9,234	9,482	46,718
Travel	1,690	1,860	2,570	2,020	2,020	10,160
Equipment	3,100	760,000	320,000	20,000	50,000	1,153,100
Supplies	890	1,350	1,400	1,400	1,400	6,440
Contractural Services	125,000	250,000	245,000	210,000	230,000	1,060,000
Construction	350,000	590,000	1,696,000	50,000	30,000	2,716,000
Other	19,200	30,000	25,000	16,000	16,000	106,200
Totals	558,645	1,705,597	2,373,497	370,214	402,112	5,410,065
FEDERAL	418,984	1,279,198	1,742,623	165,161	114,084	3,720,050
NONFEDERAL	139,661	426,399	580,874	55,053	38,028	1,240,015
USER FEES	0	0	50,000	150,000	250,000	450,000
						$5,410,065

6.12.3 Funding Strategy

As discussed in Section 6.7, revenue bonds will be utilized to generate the nonfederal share of the demonstration grant. The two agencies (counties and Metropolitan Waste Control Commission) included in the two alternative facility ownership/operator frameworks have the existing authority to issue revenue bonds.

CHEMICAL WASTE LAND DISPOSAL FACILITY
CONSTRUCTION COST ESTIMATE

1. FACILITY CONSTRUCTION

a)	Site Preparation - mobilization, rough grading, erosion control			\$ 100,000
b)	Buildings			
	Administrative	2,000 ft.^{2} @ \$35/ft.^{2}	\$ 70,000	
	Laboratory	3,000 ft.^{2} @ \$30/ft.^{2}	90,000	
	Equipment Storage	2,000 ft.^{2} @ \$30/ft.^{2}	60,000	
	Waste Storage	7,000 ft.^{2} @ \$25/ft.^{2}	175,000	
	Waste Preparation Process	7,000 ft.^{2} @ \$25/ft.^{2}	175,000	
				\$ 570,000
c)	Equipment			
	Site Preparation & Waste Placement		\$250,000	
	Waste Preparation Process		500,000	
	Office		10,000	
	Laboratory		220,000	
	Monitoring & Sample Collection		40,000	
	Rainmaking		20,000	
	Fire Protection & Safety		30,000	
				\$1,070,000
d)	Disposal Area Preparation			
	Primary Barriers & Leachate Collection		\$200,000	
	Secondary Barriers & Leachate Collection		300,000	
				\$ 500,000
e)	Paving			
	Storage Areas	50,000 ft.^{2} @ \$1/ft.^{2}	\$ 50,000	
	Parking	4,000 ft.^{2} @ \$1/ft.^{2}	4,000	
	Roads	1,500' x 24' wide @ \$2/ft.^{2}	72,000	
				\$ 126,000
f)	Utilities (sewer connection, well, water system, gas, electricty)			\$ 200,000

1. FACILITY CONSTRUCTION (cont.)

g) Landscaping & Screening		$ 50,000
h) Lower Water Supply Wells		$ 120,000
i) Environmental Protection Facilities		
Barrier Wells	$ 60,000	
Surface Runoff Storage	120,000	
		$ 180,000
j) Fencing		$ 100,000
k) Land Purchase and Relocation		$ 400,000
l) Environmental Surveillance System (construction cost)		
i) Ground Waste Quality (piezometers, soil cores)	$ 80,000	
ii) Surface Runoff & Air Quality	10,000	
		$ 90,000
m) Contingencies		$ 200,000
TOTAL CONSTRUCTION COST		$3,706,000

6.13 POTENTIAL DIFFICULTIES

The potential difficulties anticipated by the applicant in implementing the demonstration project in Minnesota are outlined in this section. Also included are the plans that the applicant intends to utilize to overcome the identified difficulties.

6.13.1 Local Area Acceptance

The applicant anticipates that local public objections to the chemical waste land disposal facility will present difficulties which must be overcome to implement the project. As discussed in the two Environmental Impact Appraisals, positive impacts to the local community from the land disposal facility are difficult to identify. Although industries attracted to the facility may increase the local tax base, attracted industries may also decrease the desirability of the community as a residential area. The residents of the local community can be expected to be hesitant about welcoming a chemical waste land disposal facility into the neighborhood.

The applicant intends to overcome this potential difficulty by designing an environmentally-safe facility and by locating the facility in an industrial area, adjacent to a major river away from residential areas. The applicant will demonstrate that any leachate accidentally released by the facility will not impair public health, safety and welfare. The various occupational safety and health programs to be implemented at the facility will also be stressed. The applicant will also carry out an aggressive citizen acceptance and public education program to bring the environmentally-safe operation of the facility to people's attention. The applicant anticipates that sufficient public support can be generated to obtain the necessary approvals to construct the facility at one of the two locations discussed in Section 6.3.4. A considerable amount of effort, however, will be needed to obtain the local approvals.

6.13.2 Budget Constraints

The applicant is aware that the U.S. Environmental Protection Agency contemplates budgeting approximately 3.5 million dollars as the Federal Government's share of the project. In preparing the project cost estimates outlined in Section 6.12, the applicant became aware of the constraints on project size and project flexibility imposed by Federal and local budget constraints. The facility will be constructed approximately two years after grant award and the increase in construction cost in two years is, of course, impossible to accurately predict. The applicant is concerned that the type of facility needed to demonstrate the various chemical waste land disposal techniques will not be able to be constructed within the available budgets in 1976 or 1977 when construction begins. Throughout the preliminary and final design phases of the project, the applicant will continuously re-evaluate project budgets and, if necessary, cut back the size of the facility while still meeting the demonstration objectives. A second alternative will be to obtain additional local money using the funding strategies outlined in Section 6.12 or an alternative local funding strategy that may be more feasible at the time of project construction.

6.13.3 Obtaining Necessary Building Materials and Equipment

The applicant is aware of the present difficulties in obtaining certain types of building materials and equipment. Due to shortages in natural materials, it is expected that delays in obtaining building materials and equipment will continue. The applicant will overcome this difficulty by expediting the selection and design of necessary waste preparation and site preparation processes. The implementation schedule included in Section 6.11 allows approximately nine months for equipment purchase and delivery. It is anticipated that at least nine months will be needed to obtain some critical pieces of equipment.

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SUMMARY OF MINNESOTA LAWS

PERTAINING TO

HAZARDOUS WASTE MANAGEMENT

DEFINITIONS

"Hazardous Waste" means any refuse or discarded material or combinations of refuse or discarded materials in solid, semi-solid, liquid, or gaseous form which cannot be handled by routine waste management techniques because they pose a substantial present or potential hazard to human health or other living organisms because of their chemical, biological, or physical properties. Categories of hazardous materials include, but are not limited to: explosives, flammables, oxidizers, poisons, irritants, and corrosives. (Minnesota Statutes, Section 116.05, Subd. 13)

"Hazardous Waste Management" means the identification, labeling, classification, storage, collection, and removal of hazardous waste from public and private property. Its transportation to intermediate or final disposal facilities, and its ultimate disposal by approved methods. (Minnesota Statutes, Section 400.03, Subd. 7)

RULES AND REGULATIONS

The Minnesota Pollution Control Agency shall adopt standards for the identification of hazardous waste and for the labeling, classification, storage, collection, transportation, and disposal of hazardous waste, recognizing that due to variable factors, no single standard of hazardous waste control is applicable to all areas of the state. In adopting standards, the Minnesota Pollution Control Agency shall recognize that elements of control which may be reasonable and proper in densely populated areas of the state may be unreasonable and improper in sparely populated or remote areas of the state. The Agency shall consider existing physical conditions, topography, soils, and geology, climate, transportation, and land use. Standards of hazardous waste control shall be premised on technical knowledge, and commonly accepted practices. No local government unit shall set standards of hazardous waste control which are in conflict or inconsistent with those set by the Pollution Control Agency. (Minnesota Statutes, Section 116.07, Subd. 2)

Pursuant to Chapter 15, the Minnesota Pollution Control Agency may adopt, amend, and rescind regulations and standards having the force of law relating to any purpose within the provisions of Chapter 116 for the identication, labeling, classification, storage, collection, treatment, and disposal of hazardous waste and location of hazardous waste disposal facilities. A regulation or standard may be of general application throughout the state or may be limited as to time, places, circumstances, or conditions. The Public Service Commission, in cooperation with the Minnesota Pollution Control Agency, shall set standards for the transportation of hazardous waste in accordance with Chapter 221.

COUNTY ORDINANCE AND GENERATORS

The county may by ordinance establish and from time to time revise rules, regulations, and standards for hazardous waste management relating to (a) identification of hazardous waste, (b) the labeling and classification of hazardous waste, (c) the handling, collection, transportation, and storage of hazardous waste, (d) the ultimate disposal site of hazardous waste, and (e) other matters as may be determined necessary for the public health, welfare, and safety. The county may issue permits or licenses for hazardous waste generation and may require the generators be registered with a county office. The ordinance may require appropriate procedures for the payment by the generator of any costs incurred by the county in completing such procedures. If the generator fails to complete such procedures, the county may recover the costs of completion in a civil action in any court of competent jurisdiction or, in the discretion of the board, the costs may be certified to the county auditor, as a special tax against the land as other taxes are collected. The ordinance may be enforced by injunction, action to compel performance, or other action in district court. Any ordinance under this section shall embody standards and requirements established by rules of the Agency. Issuing, denying, modifying, imposing conditions upon, or revoking permits pursuant to the provisions of this section or regulations promulgated hereunder shall be, subject to review, denial, suspension, and reversal by the Minnesota Pollution Control Agency. The Minnesota Pollution Control Agency shall, after written notification, have 15 days to review, suspend, modify or reverse the action of the county. After 15 days, the action of the county board shall be final subject to appear to the district court as provided in Minnesota Statutes, Section 115.05. (Minnesota Statutes, Section 400.161 and Section 473D.051)

STATEWIDE PLAN

The Minnesota Pollution Control Agency shall study and investigate the problems of hazardous waste control and shall develop a statewide hazardous waste management plan detailing the location of hazardous waste disposal facilities and storage sites throughout the state and the needs relative to the interstate transportation of hazardous waste.

Elements of the statewide hazardous spill contingency plan which relate to hazardous waste, shall be incorporated into the statewide hazardous waste management plan. The Minnesota Pollution Control Agency shall develop an informational reporting system of hazardous waste quantities generated and disposed of in the state. (Minnesota Statutes, Section 116.101)

METROPOLITAN PLAN

The Metropolitan Council shall prepare and by resolution adopt a comprehensive plan for the disposal of solid waste and the management and disposal of hazardous waste in the metropolitan area for such period as the Council deems appropriate and reasonable; and, when adopted, such plan shall be followed in the metropolitan area. In developing the plan the Council shall consider the preservation and best and most economical use of land and water resources in the metropolitan area. The plan shall

METROPOLITAN PLAN (cont'd.)

include a statement of goals and policies for solid waste disposal and hazardous waste disposal and management, criteria for solid waste disposal and management, criteria for solid waste disposal sites and hazardous waste disposal sites, the general location and capacities of needed disposal sites and facilities, projections of disposal capacities required, regulations for the operation of disposal sites and facilities, a description of disposal techniques which may be used, the type or types of solid waste and hazardous waste to be disposed of at each site or facility, and such other details as the Council deems appropriate. Criteria for solid waste disposal sites and hazardous waste disposal sites and facilities, included in the plan, shall be consistent with regulations adopted by the Agency pursuant to Sections 116.06 and 473D.07. The plan may be revised as often as the Council deems necessary in the same manner as provided for the adoption thereof. A copy of the comprehensive plan and each revision thereof shall be delivered or mailed to the Agency and the county auditor of each metropolitan county after it has been adopted. Prior to the adoption by the Council of its comprehensive plan, no metropolitan county or local governmental unit shall acquire any solid waste disposal site or hazardous waste disposal site, or facility unless approved by the Council, and after the comprehensive plan is adopted no metropolitan county, local governmental unit, or person shall acquire, improve, or operate any solid waste disposal site or hazardous waste disposal site or facility in the metropolitan area except in accordance with the plan, provided that no solid waste disposal site or hazardous waste disposal site or facility in use when the comprehensive plan is adopted shall be discontinued solely because it is not located in an area designated in the plan as acceptable for the location of such sites and facilties. (Minnesota Statutes, Section 473D.03, Subd. 1)

COUNTY REPORT AND PLAN

Each metropolitan county, as a part of its solid waste plan, shall prepare and submit to the Council for its approval, a report including: a description of the county hazardous waste ordinance, the county hazardous waste generator licensing procedures, proposed procedures for implementing the system, and an estimate of the total number of generators. Council approval or disapproval of the report shall be consistent with this section. (Minnesota Statutes, Section 473D.04, Subd. 2)

PERMITS

The Minnesota Pollution Control Agency may issue, continue in effect, or deny permits, under such conditions as it may prescribe for the treatment or disposal or both of hazardous waste, or for the installation or operation of any system or facility or any part thereof. (Minnesota Statutes, Section 116.07, Subd. 4a)

PERMITS (cont'd.)

No permit may be issued for the operation of a hazardous waste treatment or disposal site, system, or facility in the metropolitan area which does not comply with the Metropolitan Council's comprehensive plan. A copy of each permit application and any supporting information furnished by the applicant shall be sent to the Metropolitan Council within 15 days after the receipt of the application and all other information requested from the applicant. Within 45 days after the application and supporting information are received by the Council, it shall issue to the Agency in writing its determination whether the permit comples with its comprehensive plan. If the Council does not issue its determination to the Agency within the 45 day period, the permit shall be deemed to be in accordance with the Council's comprehensive plan.

MINNESOTA ADMINISTRATIVE
RULES AND REGULATIONS

MINNESOTA POLLUTION CONTROL AGENCY

DIVISION OF SOLID WASTE

1970 EDITION

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MINNESOTA POLLUTION CONTROL AGENCY

DIVISION OF SOLID WASTE

Solid Waste Disposal Regulations

January 12, 1970

TABLE OF CONTENTS

Preamble *Page*

SW 1 Applicability, Definitions and General Conditions for Solid Waste Collection, Transportation and Disposal, Severability and Variances 7

SW 2 Solid Waste Storage 11

SW 3 Collection and Transportation of Solid Waste 13

SW 4 Intermediate and Final Disposal of Solid Waste 15

SW 5 Plan Approval and Permit Issuance, Denial and Revocation 17

SW 6 Sanitary Landfill 19

SW 7 Incineration 23

SW 8 Composting 25

SW 9 Other Methods of Solid Waste Handling, Processing and Disposal 27

SW 10 Nonconforming Sites and Facilities 29

SW 11 Exemptions and County Solid Waste Management System 31

Index 33

MINNESOTA POLLUTION CONTROL AGENCY SOLID WASTE DISPOSAL REGULATIONS

PREAMBLE

The high level of production required to meet the varied needs of an expanding population and high standard of living has resulted in a sharp rise in the amount of waste materials discarded annually. Inefficient and improper methods of waste disposal have caused ever-increasing pollution of our vital air, land and water resources threatening the utility of our resources and the quality of the environment in which we live. Improper waste storage, collection, transportation and disposal endanger the public health, safety and welfare, create public nuisances, result in scenic blight and adversely affect land values. The close interrelationship of air, land and water pollution requires concerted action to preserve and improve the quality of our environment. A problem concerning solid waste will not be solved satisfactorily by creating air pollution, nor will a problem in air pollution be solved satisfactorily by intensifying the problems of water pollution. Immediate remedial action is needed to protect our valuable resources, and can only be accomplished through dedicated joint efforts.

The following solid waste disposal standards and regulations apply to any solid waste management system located partially or wholly within the State of Minnesota. Regulations are of general application throughout the state unless specifically indicated otherwise by their context. The official policy and purpose of the State of Minnesota in regard to solid waste control is set forth in Laws 1969, Chapter 1046 (Codified as Minnesota Statutes 1967, Section 116.07):

> Subd. 2. The pollution control agency shall also adopt standards for the control of the collection, transportation and disposal of solid waste for the prevention and abatement of water, air and land pollution, recognizing that due to variable factors, no single standard of solid waste control is applicable to all areas of the state. In adopting standards, the pollution control agency shall give due recognition to the fact that elements of control which may be reasonable and proper in densely populated areas of the state may be unreasonable and improper in sparsely populated or remote areas of the state, and it shall take into consideration in this connection such factors, including others which it may deem proper, as existing physical conditions, topography, soils and geology, climate, transportation and land use. Such standards of solid waste control shall be premised on technical criteria and commonly accepted practices.
>
> Subd. 4. Pursuant and subject to the provisions of chapter 15, and the provisions hereof, the pollution control agency may adopt, amend and rescind regulations and standards having the force of law relating to any purpose within the provisions of this act for the collection, transportation, and disposal of solid waste and the prevention, abatement, or control of water, air, and land pollution which may be related thereto, and the deposit in or on land of any other material that may tend to cause pollution. Any such regulation or standard may be of general application throughout the state or may be limited as to times, places, circumstances, or conditions in order to make due allowance for variations therein. Without limitation, regulations or standards may relate to collection, transportation, disposal, equipment, location, procedures, methods, systems or techniques

or to any other matter relevant to the prevention, abatement or control of water, air, and land pollution which may be advised through the control of collection, transportation and disposal of solid waste, and the deposit in or on land of any other material that may tend to cause pollution.

Consistent with these objectives, it shall be the policy of the Pollution Control Agency to encourage the development and expansion of solid waste control programs in cities, counties and other political subdivisions of the state and to provide planning, technical and enforcement assistance.

(Delete pages 7-9 in 1970 Edition and insert SW1)

SW 1 Applicability, Definitions and General Conditions for Solid Waste Collection, Transportation and Disposal. Severability and Variances.

APPLICABILITY

These are regulations and standards the provisions of which govern the storage, collection, transportation, treatment, utilization, processing, transfer, intermediate disposal and final disposal of solid waste by any person and the issuing of permits for the construction and operation of solid waste disposal sites and facilities for the protection of the environment in keeping with Chapters 115, 116, 400 and 473D of the Minnesota Statutes 1971.

DEFINITIONS

For the purpose of these regulations

(1) Agency. The Minnesota Pollution Control Agency, its agent or representative.

(2) Cell. Compacted solid wastes that are enclosed by cover material in a land disposal site.

(3) Composting. The controlled biological decomposition of selected solid waste in a manner resulting in an innocuous final product.

(4) Cover Material. Material that is used to cover compacted solid waste in a land disposal site. Important general characteristics of good cover material are low permeability, uniform texture, cohesiveness and compactibility. Suitable cover material includes sandy loam, loam, silt loam, sandy clay loam, silty clay loam, clay loam, sandy clay and loamy sand.

(5) Daily Cover. Cover material that is spread and compacted on the top and side slopes of compacted solid waste at least at the end of each operating day in order to control vectors, fire, infiltration and erosion and to assure an aesthetic appearance.

(6) Decomposition Gases. Gases produced by chemical or microbial activity during the decomposition of solid waste.

(7) Director. Director of the Minnesota Pollution Control Agency.

(8) Final Solid Waste Disposal. The site, facility, operating procedures, and maintenance thereof for the complete and ultimate disposal of solid waste by the sanitary landfill method.

(9) Flood Plain. As defined in Minnesota Statutes 1971, Chapter 104.

(10) Free Moisture. Liquid that will drain freely by gravity from solid materials.

(11) Garbage. Discarded material resulting from the handling, processing, storage, preparation, serving and consumption of food.

(12) Hazardous Infectious Waste. Waste originating from the diagnosis, care or treatment of a person or animal that has been or may have been exposed to a contagious or infectious disease. Hazardous infectious waste includes, but is not limited to,

(a) All wastes originating from persons placed in isolation for control and treatment of an infectious disease.

(b) Bandages, dressings, casts, catheters, tubing, and the like, which have been in contact with wounds, burns, or surgical incisions and which are suspect or have been medically identified as hazardous.

(c) All anatomical waste, including human and animal parts or tissues removed surgically or at autopsy.

(d) Laboratory and pathology waste of an infectious nature which has not been autoclaved.

(e) Any other waste, as defined by the State Board of Health, which, because of its hazardous nature, requires handling and disposal in a manner prescribed for (a) through (d).

(13) Hazardous Wastes. Waste materials that are (a) toxic or poisonous; (b) corrosive; (c) irritating or sensitizing; (d) radioactive; (e) hazardous infectious; (f) explosive; or (g) flammable and that present a significant hazard to human health and the environment. They include, but are not limited to, those materials and concentrations of materials that are determined to be toxic by the U. S. Secretary of Health, Education, and Welfare pursuant to Section 10.6, of the Occupational Safety and Health Act of 1970 (Public Law 91-596).

(14) Incineration. The process of burning wastes for the purpose of volume and weight reduction in facilities designed for such use.

(15) Intermediate Solid Waste Disposal. The site, facility, operating procedures and maintenance thereof, for the preliminary or incomplete disposal of solid waste including, but not limited to, transfer station, open burning, incomplete land disposal, incineration, composting, reduction, shredding and compression.

(16) Land Disposal Site. Any tract or parcel of land, including any constructed facility, at which solid waste is disposed of in or on the land.

(17) Land Pollution. The presence in or on the land of any solid waste in such quantity, of such nature and duration, and under such condition as would affect injuriously any waters of the state, create air contaminants or cause air pollution.

(18) Leachate. Liquid that has percolated through solid waste and has extracted, dissolved or suspended materials from it.

(19) Municipality. A city, village, borough, county, town, sanitary district or other governmental subdivision or public corporation, or agency created by the legislature.

(20) Open Burning. Burning any matter whereby the resultant combustion products are emitted directly to the open atmosphere without passing through an adequate stack, duct or chimney.

(21) Open Dump. A land disposal site at which solid waste is disposed of in a manner that does not protect the environment, is susceptible to open burning and is exposed to the elements, flies, rodents and scavengers.

(22) Person. Any human being, any municipality or other governmental or political subdivision or other public agency, any public or private corpora-

tion, any partnership, firm, association, or other organization, any receiver, trustee, assignee, agent, or other legal representative of any of the foregoing, or any other legal entity, but does not include the pollution control agency.

(23) Refuse. Putrescible and noputrescible solid wastes, including garbage, rubbish, ashes, incinerator ash, incinerator residue, street cleanings, and market and industrial solid wastes, and including municipal treatment wastes which do not contain free moisture.

(24) Refuse Collection Service. A public or private operation engaged in solid waste collection and solid waste transportation.

(25) Regional Flood. As defined in Minnesota Statutes 1971, Chapter 104.

(26) Rubbish. Nonputrescible solid wastes, including ashes, consisting of both combustible and noncombustible wastes, such as paper, cardboard, tin cans, yard clippings, wood, glass, bedding, crockery, or litter of any kind.

(27) Runoff. The portion of precipitation that drains from an area as surface flow.

(28) Sanitary Landfill. A land disposal site employing an engineered method of disposing of solid waste on land in a manner that minimizes environmental hazards by spreading the solid waste in thin layers, compacting the solid waste to the smallest practical volume, and applying cover material at the end of each operating day, or at intervals as may be required by the Agency.

(29) Scavenging. Uncontrolled removal of solid waste materials.

(30) Solid Waste. Garbage, refuse and other discarded solid materials, except animal waste used as fertilizer, including solid waste materials resulting from industrial, commercial and agricultural operations, and from community activities. Solid waste does not include earthen fill, boulders, rock and other materials normally handled in construction operations, solids or dissolved material in domestic sewage or other significant pollutants in water resources, such as silt, dissolved or suspended solids in industrial waste water effluents, dissolved materials in irrigation return flows, or other common water pollutants.

(31) Solid Waste Collection. The gathering of solid waste from public or private places.

(32) Solid Waste Management System. A total system for the storage, collection, transportation, intermediate and final disposal of solid waste.

(33) Solid Waste Storage. The holding of solid waste near the point of generation.

(34) Solid Waste Transportation. The conveying of solid waste from one place to another, by means of vehicle, rail car, water vessel, conveyor or other means.

(35) Transfer Station. A facility in which solid waste from collection vehicles is concentrated for subsequent transport. A transfer station may be fixed or mobile.

(36) Underground Water. The water contained below the surface of the earth in the saturated zone including, without limitation, all waters whether

under confined, unconfined or perched conditions in near surface unconsolidated sediment or regolith, or in rock formations deeper underground. The term ground water shall be synonymous with underground water. Refer to Minnesota Pollution Control Agency Regulation WPC 22.

(37) Water Monitoring System. A system of wells, lysimeters, or other mechanisms used to obtain representative samples of both underground water and surface water where required in the vicinity of a land disposal site.

(38) Water Table. The surface of the ground water at which the pressure is atmospheric. Generally this is the top of the saturated zone. Refer to Minnesota Pollution Control Agency Regulation WPC 22.

(39) Wetland. A natural marsh where water stands near, at or above the soil surface during a significant portion of most years, and which is eligible for classification as an inland fresh water wetland type 3, 4 or 5 under U. S. Department of Interior classifications.

(40) Working Face. That portion of the land disposal site where waste is discharged and is spread and compacted prior to the placement of cover material.

GENERAL CONDITIONS

All solid waste shall be stored, collected, transferred, transported, utilized, processed and disposed of, or reclaimed in a manner consistent with requirements of these regulations. The Agency is responsible for enforcement of these regulations and encourages cooperation of municipalities which may adopt these regulations for use in local laws, ordinances or regulations.

SEVERABILITY

If any provision of any regulation or the application thereof to any person or circumstances is held to be invalid, such invalidity shall not affect other provisions or application of any other part of such regulation or any other regulation which can be given effect without the invalid provision of application, and to this end the provisions of all regulations and the various applications thereof are declared to be severable.

VARIANCES

Where upon written application of the responsible person or persons the Agency finds that by reason of exceptional circumstances strict conformity with any provisions of the regulations contained herein would cause undue hardship, would be unreasonable, impractical, or not feasible under the circumstances, the Agency may permit a variance from these regulations upon such conditions and within such time limitations as it may prescribe for prevention, control or abatement of air, land or water pollution in harmony with the intent of the State and any applicable Federal laws.

Filed with Secretary of State and Commissioner of Administration September 26, 1973

SW 2 Solid Waste Storage

(1) The owner and occupant of any premises, business establishment, or industry shall be responsible for the satisfactory storage of all solid waste accumulated at that premise, business establishment or industry.

(2) Garbage and similar putrescible waste shall be stored in:

(a) Durable, rust resistant, nonabsorbent, watertight, rodent proof, and easily cleanable containers, with close fitting, fly-tight covers and having adequate handles or bails to facilitate handling, or;

(b) Other types of containers acceptable to the municipality and conforming to the intent of this regulation.

(c) The size and allowable weight of the containers may be determined by the refuse collection service subject to requirements of the municipality.

(3) Refuse shall be stored in durable containers or as otherwise provided in this regulation. Where garbage and similar putrescible wastes are stored in combination with nonputrescible refuse, containers for the storage of the mixture shall meet the requirements for garbage containers.

(4) Toxic or hazardous wastes shall be stored in the proper containers which are adequately labeled in a safe location and in compliance with the regulations of federal, state and local governments, and their regulatory agencies.

(5) All containers for the storage of solid waste shall be maintained in such a manner as to prevent the creation of a nuisance or menace to public health. Containers that are broken or otherwise fail to meet requirements of this regulation shall be replaced with acceptable containers.

(6) Solid waste objects or materials too large or otherwise unsuitable for storage containers shall be stored in a pollution and nuisance free manner and in compliance with the regulations of federal, state and local governments, and their regulatory agencies.

SW 3 Collection and Transportation of Solid Waste

(1) The owner and occupant of any premises, business establishment or industry and/or the refuse collection service shall be responsible for the satisfactory collection and transportation of all solid waste accumulated at a premise, business establishment or industry to a solid waste disposal site or facility, for which a permit has been issued by the Agency unless otherwise provided in these regulations.

(2) Vehicles or containers used for the collection and transportation of garbage and similar putrescible wastes, or refuse containing such materials, shall be covered, leakproof, durable and of easily cleanable construction. These shall be cleaned to prevent nuisances, pollution or insect breeding, and shall be maintained in good repair.

(3) Vehicles or containers used for the collection and transportation of any solid waste shall be loaded and moved in such a manner that the contents will not fall, leak or spill therefrom, and shall be covered when necessary to prevent blowing of material. Where spillage does occur, the material shall be picked up immediately by the collector or transporter and returned to the vehicle or container and the area properly cleaned.

(4) Vehicles and containers used for the collection and transportation of toxic or hazardous wastes shall be durable, enclosed and leakproof and shall be constructed, loaded, moved and unloaded in a safe manner and in compliance with the regulations of federal, state and local governments and their regulatory agencies.

SW 4 Intermediate and Final Disposal of Solid Waste

Open burning is prohibited at all intermediate and final solid waste disposal sites, except as shall be allowed by any regulations of the Agency now or hereafter adopted.

Solid waste shall not be deposited at any intermediate or final solid waste disposal site in such a manner that material or leachings therefrom may cause pollution of ground or surface waters.

A person shall make an intermediate or final disposal of any solid waste, only at a site or facility for which a permit has been issued by the Agency unless otherwise provided by these regulations. Permits shall not be required for sites used for the disposal of solid waste from only a single family or household, a member of which is the owner, occupant or lessee of the property, under these regulations, but these shall be operated and maintained in a nuisance-free, pollution-free and aesthetic manner consistent with the intent of these regulations.

Disposal of toxic and hazardous wastes shall be in a safe and pollution-free manner and in compliance with the regulations of federal, state and local governments and their regulatory agencies.

SW 5 Plan Approval and Permit Issuance, Denial and Revocation

It shall be unlawful for any person to establish, maintain, conduct or operate an intermediate or final solid waste disposal site or facility except as provided in these regulations without first obtaining a permit from the Agency.

(1) Although a permit shall be granted the same shall become effective only if the location of the site or facility shall conform to all applicable federal, state and local laws, ordinances and regulations.

(2) Each permit application shall be accompanied by plans as described in these regulations and a plan of operation indicating procedures which will be followed to fulfill requirements of these regulations.

(3) Plans and specifications shall be approved and a permit issued when the Director of the Agency believes that they are in accordance with the requirements as set forth in these regulations.

(4) Denial of Permit. When a permit is denied, applicant shall be notified in writing of the reasons therefor. A denial shall be without prejudice to the applicant's right to an appearance before the Agency or for filing a further application after revisions are made to meet objections specified as reasons for the denial.

(5) Revocation of Permit. Permits may be revoked for violation of these regulations.

(Delete pages 19-21 in 1970 Edition and insert SW 6)

SW 6 Sanitary Landfill

The sanitary landfill method shall be used for all final disposal of solid waste.

(1) The fill and trench areas of sanitary landfill sites are prohibited within the following areas, as existing at the time of receipt of the permit application by the Agency:

(a) 1,000 feet from the normal high water mark of a lake, pond or flowage.

(b) 300 feet from a stream.

(c) A regional flood plain (100 year flood).

(d) Wetlands.

(e) Within 1,000 feet of the nearest edge of the right-of-way of any state, federal or interstate highway or of the boundary of a public park or of an occupied dwelling. Permission may be granted under this subsection, without these distance requirements, at the discretion of the Director, taking into consideration such factors as noise, dust, litter and other aesthetic and environmental considerations.

(f) Locations considered hazardous because of the proximity of airports.

(g) An area which is unsuitable because of reasons of topography, geology, hydrology or soils.

(2) Any person who maintains or operates a sanitary landfill site or permits the use of property for such, shall maintain and operate the site in conformance with the following practices unless otherwise allowed by the Agency in issuing the required permit:

(a) Open burning shall be prohibited.

(b) Solid waste shall not be deposited in such a manner that material or leachings therefrom may cause pollution of underground or surface water.

Proposed separation between the lowest portion of the landfill and the high water table elevation shall be a minimum of five feet. This requirement shall not be construed to render inoperative any other requirements specified herein and additional ground water protection shall be provided if needed.

(c) Dumping of solid waste shall be confined to as small an area as practicable and with appropriate facilities to confine possible wind-blown material within the area. At the conclusion of each day of operation, all wind-blown material resulting from the operation shall be collected and returned to the area by the owner or operator.

(d)(i) Solid waste shall be compacted as densely as practicable and covered after each day of operation, or as specified by the Director, with a compacted layer of at least six inches of suitable cover material. All previously filled areas shall be maintained with at least six inches of suitable cover material.

(ii) If refuse cells will be exposed to the elements for a period of 120 days or longer, an intermediate cover totalling at least twelve inches of compacted, suitable cover material shall be provided and maintained.

(iii) There shall be an available supply of suitable cover material, which, if necessary, shall be stockpiled and protected for winter operation.

(iv) The sanitary landfill shall be constructed and cover material graded so as to promote surface water runoff without excessive erosion.

(e) Surface water drainage shall be diverted around and away from the landfill operating area.

(f) A minimum separating distance of 20 feet, or greater as specified by the Director, shall be maintained between the disposal operation and the adjacent property line.

(g) Effective means shall be taken if necessary to control flies, rodents, and other insects or vermin.

(h) The approach road to the disposal site and the access road on the site shall be of all-weather construction and maintained in good condition so that they will be passable at all times for any vehicle using the site.

(i) Adequate dust control on the site shall be provided.

(j) Equipment shall be available for adequate operation of the site. The equipment shall be provided with adequate safety devices and adequate noise control devices.

(k) Equipment shall be provided and kept at the site during the hours of operation to control accidental fires and arrangements made with the local fire protection agency to immediately acquire their services when needed.

(l) Adequate communication facilities shall be provided for emergency purposes.

(m) Sanitary facilities and shelter shall be available for site personnel.

(n) Scavenging shall be prohibited to avoid injury and prevent interference with operations.

(o) The site shall be adequately screened by existing or provided means.

(p) There shall be qualified personnel for general direction and operation of the site on duty at all times while it is open for public use.

(q) Access to the site shall be controlled. A gate shall be provided at the entrance to the site and kept locked when an attendant is not on duty.

(r) A permanent sign, identifying the operation and showing the permit number of the site, and indicating the hours and days the site is open for public use, rates, hazardous wastes information, the penalty for nonconforming dumping, and other pertinent information, shall be posted at the site entrance.

(s) A water monitoring program shall be constructed and operated to determine whether or not solid waste or leachate therefrom is causing pollution of underground or surface water. The drilling and construction of all site wells, including those used for monitoring purposes, shall be done in compliance with Minnesota Statutes 1973, Chapter 747.

The conditions of monitoring, including the frequency and the analysis of water monitoring samples, shall be determined by the Director and may be changed at his discretion.

(t) Approved leachate collection and treatment systems shall be used where required to protect underground and surface water.

(u) Decomposition gases shall not be allowed to migrate laterally from the sanitary landfill. They shall be vented into the atmosphere directly through the cover material, or into cut-off trenches, or into the atmosphere by forced ventilation, or by other means approved by the Director so that explosive concentrations are prevented.

(v) The following shall not be acceptable for deposit in sanitary landfills except in amounts normal in household waste:

(i) Liquids

(ii) Any of the following: digested sewage sludges, lime sludges, grit chamber cleanings, bar screenings and other sludges, unless approved by the Director. Approval will be based on consideration of such factors as chemical composition, free moisture content and workability.

(iii) In no case will raw sewage sludge, raw animal manure or septic tank pumpings be acceptable.

(iv) Hazardous wastes, as identified by the Agency.

(v) Other substances that may be deemed unacceptable by the Agency.

(w) A storage area for hazardous wastes shall be provided at the sanitary landfill.

(x) Dead animals shall be transported and disposed of in accordance with Minnesota Statutes 1971, Chapter 35. When received at a sanitary landfill, household pet animal carcasses should be buried along with other refuse. Larger animal carcasses may be buried in the fill and trench area under other refuse, but the carcass itself must first be completely covered separately with at least twelve inches of earth material. Animal carcasses may be buried in a separate area of the landfill site at a depth of at least three feet.

(y) When disposed of at a sanitary landfill, certain demolition and construction type wastes may be disposed of in a separate area, as specified by the Director.

(z) The permittee shall properly complete the Agency operational report form and submit it monthly to the Agency, whether or not the permitted landfill is yet constructed or whether or not it is in operation.

(aa)(i) Within one month after final termination of a site, or a major part thereof, the area shall be covered with at least two feet of compacted earth material, graded to a minimum 2 percent slope to promote surface water runoff without excessive erosion.

(ii) The finished surface of the filled area shall be covered and maintained with adequate top soil and seeded to provide suitable vegetation immediately upon completion, or immediately in the spring on areas terminated during winter conditions. If necessary, seeded slopes shall be covered with straw or similar material to prevent erosion.

(iii) Prior to completion of a sanitary landfill site, the Agency shall be notified in order that a site investigation may be conducted by the Agency staff before earth moving equipment is removed from the property.

(iv) After completion of a sanitary landfill site, a detailed description, including a plat, shall be recorded with the county register of deeds. The description shall include general types and location of wastes, depth of fill, and other information of interest to future land owners.

(v) If the completed site is to be cultivated, the integrity of the finished surface shall not be disturbed by agricultural cultivation activities. If cultivated, a sufficient depth of cover material to allow cultivation and to support vegetation shall be maintained.

(3) Plans, including a permit application, report and drawings shall be prepared by a registered engineer of Minnesota. Three complete sets of the plans shall be submitted to the Agency. The submitted plans shall include the following:

(a) A completed permit application form.

(b) An engineering report including:

(i) General information.

(ii) Site analysis including consideration of each item in SW 6 (1) along with data and supplementary reports, including soil boring data and a hydrogeologic study. Attention to this requirement must include consideration of surface features, underground formations, soil boring data from soil borings of which at least one is to a minimum depth of 50 feet below proposed excavation and lowest elevation of the site, water table profile, direction of underground water flow, initial quality of water resources in the potential zone of influence of the landfill, use of water resources in the potential zone of influence of the landfill, need and availability of cover material, and existing refuse deposits. Also considered shall be climate, average rates of precipitation based on average monthly rates from records of rain gauge stations, evapotranspiration, runoff and infiltration.

(iii) Proposed operating procedures including consideration of each item in SW 6 (2).

(iv) Equipment to be used for operation of the site.

(c) Drawings, folded to 8½ by 11 inch size, including:

(i) An Existing Conditions Plan of the area showing land use and zoning within ¼ mile of the proposed solid waste disposal site. The plan shall show all buildings, lakes, ponds, watercourses, wetlands, sinkholes, rock outcroppings, roads, public parks and other applicable details and shall indicate the general topography with contours and drainage patterns. An on-site bench mark shall be indicated and a north arrow drawn. A location insert map and a U.S.G.S. topographic map of the area shall be included. The scale of the existing conditions plan shall not be greater than 300 feet per inch.

(ii) A Development Plan of the site and immediately adjacent area showing dimensions, contours, at contour intervals of two feet or less, soil boring locations with surface elevations and present and planned pertinent features, including but not limited to roads, screening, buffer zone, fencing, gate, shelter and equipment buildings, surface water diversion and drainage, water monitoring system and the hazardous wastes storage area. The development plan shall show progressive development of trench and/or area fills and any phase construction. The scale of the development plan shall not be greater than 200 feet per inch.

The development plan shall include consideration of the ultimate land use, for example, pre-planned building islands, not to be used for landfilling of refuse.

(iii) Cross Sections Plan including a minimum of two cross sections of each phase, perpendicular to one another, showing existing grade, excavation grade, final grade, any additional ground water protection, high water table profile and profile of a separation line five feet above, profile and identity of soils and profile and identity of bedrock.

(iv) An Ultimate Land Use Plan showing the land use after the site is completed, final contours, at contour intervals of two feet or less, and surface water drainage. Consideration shall be given in the design of an ultimate land use plan to gas control, erosion and differential settlements. The scale of the ultimate land use plan shall not be greater than 200 feet per inch.

(4) A sanitary landfill shall not be opened or placed into operation until:

(a) An Agency permit has been issued.

(b) A construction certification has been approved by the Director. The certification, signed by the project engineer, shall certify, with any exceptions listed, that the construction has been completed in accordance with the plans and Agency permit. It shall be certified that an Agency-approved water monitoring system is functional and includes an analysis of initial water monitoring samples.

If any construction has been scheduled in the plans for phase development subsequent to the initial operation, then a similar certification shall be approved for each phase before it shall be operated.

(c) The site is consistent with the county solid waste management system plan.

(5) These regulations shall be effective as to the construction of permitted sanitary landfills when the permit applications and final plans are received after the date these regulations are filed with the Commissioner of Administration; provided, however, the Agency reserves the right to require compliance with any provision of these regulations in order to abate pollution.

Filed with Secretary of State and Commissioner of Administration September 26, 1973

SW 7 Incineration

This regulation applies only to existing and new incinerators having a capacity greater than 6,000 pounds per hour and those for the incineration of toxic or hazardous wastes: All incinerators shall be designed and operated in a manner to conform to emission limitations of Regulation APC 7 and other Air Pollution Control Regulations of the Agency now or hereafter adopted. All incinerators shall have adequate disposal of liquid wastes. Any discharge to surface or ground waters of the state must meet the Agency's regulations of water quality or effluent standards now or hereafter adopted. Residue from all incinerators must be disposed of in conformance with these regulations.

(1) It is unlawful for any person to install a new incinerator or install or alter any incinerator appurtenances, except for routine maintenance, without first having been issued a permit by the Agency.

(2) When a permit is desired, the following details shall be submitted to the Agency for review:

(a) A minimum of three sets of plans and specifications, folded to 8½ inch by 11 inch size, prepared by a registered engineer of Minnesota, clearly indicating the construction which will be undertaken. These details shall include a plot plan showing land use, zoning, and the location, type and height of all buildings within 500 feet of the proposed installation.

(b) An engineering report including furnace design criteria and expected performance data, the present, and future population and area to be served by the incinerator, and the characteristics, quantities and sources of solid waste to be incinerated.

(c) Plans for the disposal of incinerator residue, and emergency disposal of solid waste in the event of major incinerator plant breakdown.

(d) Information relating to Regulation SW 5.

(e) Owner of the site and/or plant.

(f) Persons responsible for actual operation and maintenance of the plant and intended operating procedures.

(g) Such additional data and information as may be requested by the Agency.

(3) The incinerator operation for each proposed installation shall be considered for approval on its own merits, shall be in compliance with the following criteria, and in accordance with accepted engineering practices.

(a) The incinerator plant shall be so situated, equipped, operated, and maintained as to minimize interference with other activities in the area.

(b) Shelter and sanitary facilities shall be available for plant personnel.

(c) A permanent sign shall be posted at the site entrance identifying the operation and showing the permit number of the plant, and indicating the hours and days when the plant is open for public use. Access to the plant shall be limited to those times when authorized personnel are on duty.

(d) All incoming solid waste to be incinerated at the plant shall be confined to the unloading area. Adequate holding bin capacity shall be provided.

(e) Facilities shall be designed to provide for dust control in the unloading and charging areas.

(f) The incinerator plant shall have weighing facilities available. The Agency may require that permanent records be maintained for inspection as to the total weight of material incinerated, the total quantity of resulting residue and total hours of plant operation.

(g) Fire-fighting equipment, meeting the standards of Underwriters Laboratory, Inc., or other approved nationally recognized safety standards, shall be available in the storage and charging areas and elsewhere as needed.

(h) Arrangements shall be made with the local fire protection agency to provide fire-fighting forces in an emergency.

(i) Adequate communication facilities shall be provided for emergency purposes.

(j) Equipment shall be provided in the storage and charging areas and elsewhere as needed to allow cleaning after each day of operation or as may be required in order to maintain the plant in a sanitary condition.

(k) The charging openings as well as all equipment throughout the plant shall be provided with safety equipment.

(l) During normal operation, the temperature in the combustion chambers shall conform to Regulation APC 7 and other Air Pollution Control Regulations of the Agency now or hereafter adopted, to produce a satisfactory residue and to result in an odor-free operation.

(m) A continuously recording pyrometer shall be provided in order to maintain continuous records of temperature in the combustion chambers. A copy of such records shall be available for the Agency upon request.

(n) All residue removed from the incinerator plant shall be promptly disposed of at an approved site, and in a manner that will prevent nuisances, pollution and public health hazards. Residue containing combustible material shall be disposed of in a sanitary landfill in conformance with Regulation SW 6.

(o) Upon completion of the plant and prior to initial operation, the Agency shall be notified to allow personnel of the Agency to inspect the plant both prior to and during the performance tests.

(p) Performance tests of the plant may be required by the Agency. A report covering the results of the performance tests in such case shall be prepared by the design engineer of the project and submitted to the agency with the copy of all supporting data.

(4) Existing incinerators which do not meet the above criteria shall be reconstructed in order to meet the foregoing standards as specified in Regulation SW 10.

(5) Reports describing the total weight of material incinerated, the total quantity of resulting residue and residue disposition, and the total hours of plant operation shall be submitted to the Agency every month, together with other information on the operation of the incinerator.

SW 8 Composting

(1) It is unlawful for any person to install or alter any composting operation without first having been issued a permit by the Agency. (See also SW 4)

(2) When a permit is desired, the following details shall be submitted to the Agency for review, prepared by a registered engineer of Minnesota.

(a) A minimum of three sets of plans and specifications, folded to 8½ inch by 11 inch size, clearly indicating the layout and construction which will be undertaken.

(b) A minimum of three sets of maps or aerial photographs indicating land use and zoning within ¼ mile of the facility. The map or aerial photograph shall be of adequate scale to show all homes, buildings, lakes, ponds, watercouses, wetlands, dry runs, rock outcroppings, roads and other applicable details and shall indicate the general topography with contours and drainage patterns. Wells and soil boring locations should be identified on the map or aerial photograph.

(c) Details relating to geological formations of the property whereon the proposed installation is to be located. Such details shall be determined by soil borings or other appropriate means to a depth of at least ten feet. The high water table should be included.

(d) An engineering report outlining the proposed method of operation, the quantity and source of material to be processed, the proposed use and distribution of the processed material, and related details.

(e) Information relating to Regulation SW 5.

(f) Owner of the site and/or plant.

(g) Persons responsible for actual operation and maintenance of the plant.

(h) Additional data or information may be required by the Agency.

(3) The operation shall be conducted in a manner which minimizes pollution, public health hazards and nuisances.

(4) Materials resulting from composting or similar processes and offered for sale shall contain no pathogenic organisms, shall not reheat upon standing, shall be innocuous, and shall contain no sharp particles which would cause injury to persons handling the compost.

(5) By-products removed during processing shall be handled in a pollution and nuisance free manner and shall be disposel of as provided in these regulations.

(6) Reports describing the types and amounts of waste composted, the amount of compost produced, and the amounts of by-products removed and the disposition of the by-products shall be submitted to the Agency every month together with other information on the operation of the compost plant.

SW 9 Other Methods of Solid Waste Handling, Processing and Disposal

Before a site or facility for any method of solid waste handling, processing and disposal, including transfer stations, not otherwise provided for in these regulations is practiced or placed into operation, three sets of complete plans, specifications, design data, ultimate land use plan and proposed operating procedures shall be submitted to the Agency for review and permit issuance. All such information shall be prepared and submitted by a registered professional engineer of Minnesota.

SW 10 Nonconforming Sites and Facilities

Modification of existing sites and facilities, and of operating procedures to conform to the requirements of these regulations shall be accomplished. When the degree of necessary improvement is of such extent that immediate compliance cannot be accomplished, special consideration may be given by the Agency. In such event, the owner of the nonconforming site or facility shall, not later than six months after the effective date of these regulations, submit to the Agency a report setting forth a program and plan for compliance with these regulations. Included with this report shall be a time schedule for submission of plans and specifications and a time schedule requiring commencement and completion of construction of necessary operations or improvements. In any event such construction shall be completed by not later than July 1, 1972.

SW 11 Exemptions and County Solid Waste Management System

The Agency will consider permitting annual exemptions, during a transition and planning period ending July 1, 1972, for the operation of existing intermediate solid waste disposal sites, but only under the following circumstances:

(1) When a disposal operation serves a resident population of less than 1,000 people, open dumps may be operated under the following conditions:

(a) The permit is reviewed annually with particular regard to all aspects of potential hazard to public health and safety.

(b) At the site entrance is a permanent sign identifying the operation and showing the permit number of the site, and indicating the hours and days the site is open for public use, the penalty for non-conforming dumping, that toxic and hazardous wastes may not be dumped therein, and other pertinent information.

(c) No toxic or hazardous wastes, no domestic sewage, and no industrial wastes are dumped at the site.

(d) The dump is at least ¼ mile from any residence or place of public gathering.

(e) The dump is compacted and covered with earth at least 12 inches in depth at least four times per year, or more often when directed by the Agency.

(f) Animal carcasses and garbage are buried at least weekly.

(g) Adequate measures are taken to protect the surrounding area from wind-blown debris, and from the spread of accidental fires from the disposal site.

(h) Open burning of solid waste is prohibited except as otherwise provided by Agency Regulation APC 8.

(i) Arrangements have been made with a local fire-fighting department to provide for immediate fire-fighting service in case of an emergency.

(j) That the dumping and disposal at such dump complies with Regulation SW 6 — Section (2) (b) and (2) (g).

(2) When the disposal operation serves a resident population of 1,000 to 2,500 people modified sanitary landfills may be operated under the following conditions:

(a) The permit is reviewed annually with regard to potential hazard to the public health and safety.

(b) The disposal operation is located at least ¼ mile from the nearest residence or place of public gathering.

(c) Animal carcasses and garbage are buried daily.

(d) The fill area is compacted and covered with six inches of earth weekly, on a regular schedule, or more frequently as may be required by the Agency.

(e) Adequate measures are taken to protect the surrounding area from wind-blown debris, and such materials are cleaned up promptly.

(f) Adequate measures are taken to protect the surrounding area from the spread of accidental fires from the disposal area, and arrangements have been made with a local fire-fighting department to provide for immediate fire-fighting service in case of emergency.

(g) An insect and rodent control program is followed for protection of the public health and safety.

(h) Open burning of solid waste is prohibited except as otherwise provided by Agency Regulation APC 8.

(i) At the site entrance is a permanent sign identifying the operation and showing the permit number of the site, and indicating the hours and days the site is open for public use, the penalty for non-conforming dumping, and other pertinent information.

(j) The disposal operation has a gate at the entrance.

(k) The road leading to the disposal site is all-weather construction.

(l) That the disposal of waste at such disposal site complies with Regulation SW 6 — Section (2) (b).

(3) On or before July 1, 1971 each county shall submit to the Agency a workable preliminary plan for a solid waste management system within such county. On or before July 1, 1972 each county shall submit for the approval of the Agency a workable final plan for a solid waste management system within such county. The plan shall be amended from time to time as changing conditions occur, by filing revisions for the approval of the Agency. Such plans and revisions shall be adopted by the Board of Commissioners of the county prior to filing with the Agency.

Each county shall provide for a solid waste management system plan to serve all persons within the county. Two or more counties may elect to submit a joint plan.

(Insert opposite page 32)

Sw 12 Solid Waste Land Disposal Site Abandonment

This regulation applies to all land disposal sites, including abandoned dumps.

The person or persons (as defined in SW 1) having the responsibility for the operation of the site must accomplish the closure of the site.

The closure of the site shall include the following procedures:

(1) Designate a substitute site or facility which has been approved by the Agency and notify the media and the general public of the closing and of the substitute site.

(2) Close access to the site and prohibit refuse disposal.

(3) Stop any burning.

(4) Eradicate rodents.

(5) Provide measures to protect underground and surface water.

(6) Divert surface water drainage around and away from the disposal area.

(7) Compact refuse and cover with a minimum of two feet of compacted earth material.

(8) Establish and maintain final grade to promote surface water runoff without excessive erosion. Seed to provide suitable vegetation.

(9) Record a detailed description, including a plat, with the county register of deeds. The description shall include general types and location of wastes, depth of fill, and other information of interest to potential land owners.

(10) An authorized official shall properly complete the disposal site closure record and submit it to the Agency.
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CASE STUDIES - MINNESOTA HAZARDOUS WASTE POLLUTION INCIDENTS

Improper storage, transportation, handling, treatment and disposal of hazardous wastes has the potential of adversely affecting the public health and the environment. Possible public health and environmental effects are:

- Danger From Improperly Handling of Hazardous Waste - Improper handling of hazardous waste can result in burns, fires, explosions, and poisonings. These effects can occur at any stage of the generation-transportation-disposal chain.

- Pollution of Water, Land and Air from Spills of Hazardous Waste in Transit-Spills of hazardous waste can pollute the groundwater and surface water systems. Likewise, spills can release noxious gases into the atmosphere affecting public health and the environment. Accidental spills of hazardous waste can also harm plant and wildlife in the spill area.

- Pollution of Groundwater and Surface Water From the On-land Disposal of Hazardous Waste - The clean-up of groundwater pollution presents a particularly difficult problem for a number of reasons. Groundwater moves very slowly and the groundwater system has very little permanent waste assimilative capacity. This means that once the contaminant enters the groundwater system, the effects may be long lasting. Pollution of the groundwater system is often not detected until the damage is widespread. With time, the exact location of land disposal sites can be forgotten and possible future adverse effects from the wastes may not be recognized nor attributed to their actual source until serious damage has occurred. Gradual leaching of hazardous materials into surface water systems can have a chronic effect on public health through public water supply as well as a chronic effect on the environment.

- Pollution of the Atmosphere From Incineration of Hazardous Waste - Many hazardous materials will release harmful waste products when burned in an incinerator. If not controlled, these wastes can exert a chronic poisoning effect on public health as well as on vegetation and wildlife in the area surrounding the facility.

Numerous case studies within Minnesota as well as nationwide document the potential danger to the public health and to the environment from the improper management of hazardous waste. The following case studies are examples:

PESTICIDE CONTAMINATION - MINNESOTA(2). An arsenic pesticide was used to control a grasshopper infestation near Perham, Minnesota in 1934. After the infestation was under control, the unused pesticide was buried in an unmarked shallow trench far from any urbanized areas. In 1972 a shallow well was installed near the pesticide disposal area to serve as a water supply for a local construction company. Soon after the well was placed in service, thirteen employees were stricken with what was later diagnosed to be arsenic poisoning. All of the thirteen employees required medical treatment and two had to be hospitalized. One employee was hospitalized for more than a month and still suffers from nerve damage.

ON-LAND DISPOSAL OF INDUSTRIAL WASTES - MINNESOTA(3). From the mid-50's until 1966, spent industrial solvents and acids were disposed in an on-land disposal pit at a site in Woodbury Township. In May 1966 a private well near the disposal site was found to be contaminated with one of the industrial solvents being discharged into the on-land disposal pit. It had taken approximately 10 years for the pollution of the groundwater system to be discovered. It has been a costly and difficult matter to pump out the aquifer and dispose of the contaminated groundwater.

IMPROPER HAZARDOUS WASTE HANDLING - MINNESOTA(4). An employee of a Dakota County landfill was seriously burned when a piece of equipment he was operating crushed and ignited a container of flammable solvent which had been illegally deposited in the landfill. The employee suffered burns over 85% of his body and was hospitalized in intensive care for four and one-half months.

CREOSOTE MANUFACTURE AND USE - MINNESOTA(3). A creosote manufacturer and a creosote user have been operating at the same site in a Minneapolis suburb for over 50 years. Over the years much of the 80 acre site has become saturated with creosote and other petroleum products. In 1932, complaints of a "tarry" taste forced the abandonment of a municipal well. During the same period the use of a group of shallow private wells was discontinued due to taste and odor problems. Investigation of the groundwater contamination could find no other source responsible for the taste and odor than the creosoting operations. Apparently, because other sources of drinking water were readily available, no actions were taken to treat the source of the problem. According to Pollution Control Agency studies, if surface water, contaminated by creosote saturated soils, are continually allowed to reach the water table it is likely that deeper wells and wells at greater distances from the presently contaminated area stand a chance of being contaminated. The Pollution Control Agency has authorized legal action against the two creosoting operations. At the present time studies are being undertaken to determine what renovative work will be necessary before the companies terminate operations.

GASOLINE POLLUTION - MINNESOTA(3). It is hypothesized that prior to 1950 an accidental spill of gasoline took place near a large gasoline storage facility north of St. Paul. During 1957, private wells in the area began to exhibit taste and odors similar to gasoline. By 1958, the taste and odor had traveled to the south and had contaminated a municipal well. A carbon filter was installed on the well to extract hydrocarbons for laboratory analysis. Examination of the filter media confirmed the presence of gasoline. Since it appeared that new wells drilled in the area could become contaminated at a later date, the municipality decided to connect to the St. Paul water supply system. Since 1958 more wells have been contaminated by gasoline. At the present time the contamination has traveled approximately 2 miles.

LIQUID CHEMICAL WASTE DISPOSAL - MINNESOTA. During 1972, approximately 97 barrels of liquid chemical wastes including oil and paint were deposited in a shallow pit in Wright County. The barrels of waste were unlabeled and, according to witnesses, some of the barrels were leaking liquid wastes onto the ground. The liquid chemical waste was eventually transported to an incinerator for proper disposal.

SEPTIC AND HOLDING TANK DISPOSAL - MINNESOTA. In many portions of the study area, evidence exists that raw septic tank sludge is being placed into sanitary landfills. Solid waste administrators in Wright and Anoka Counties indicated that such disposal was occurring in their respective counties(55). Scavengers who haul septic tank sludge are also employed to pump out industrial holding tanks which often contain hazardous waste. This represents a known source of unregulated land disposal of hazardous waste.

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